

**Understanding Sexual Concurrency and HIV/AIDS: Implicit and Explicit Attitudes in a  
South African Student Population**

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by

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## ABSTRACT

There are more people infected with HIV in South Africa, than in any other country in the world. Studies indicate a plausible relationship between concurrently organised sexual partnership and the spread of STIs, with concurrency being accountable for as much as 74% of HIV infections in South Africa. Understanding sexual concurrency is therefore of vital importance, especially in the South African perspective. It has, however, become increasingly unreliable to rely solely on explicit self-measures to study sexual concurrency, and research has suggested that implicit cognition is a reliable alternative to understanding sexual behaviour and attitudes towards sexuality, which cannot be directly measured by explicit means.

The purpose of this study was to understand sexual concurrency among a population of university students by researching their implicit and explicit attitudes towards sexual concurrency; and thereby to aid in understanding sexual concurrency in relation to the spread of HIV. A quantitative research methodology was used to analyse results from explicit measures of sexual concurrency in the form of a questionnaire, and implicit measures of sexual concurrency in the form of the Implicit Association Test (IAT). Although no correlation existed between implicit and explicit measures attitudes towards sexual concurrency, it was, however, observed that sexual concurrency has and is being broadly practiced, and that age is a key determinant for sexual concurrency.

*Keywords: HIV/AIDS, Sexual concurrency, implicit and explicit attitudes, measures for sexual concurrency, student*

## **DECLARATION OF ORIGINALITY**

I, the undersigned, hereby declare that the work contained in this thesis is my own work, unless otherwise referenced. It has not been previously submitted at any other university for the purposes of fulfilment of a degree.

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## CHAPTER ONE

### CONTEXT

The principal endeavour of this study was to explore the phenomenon of sexual concurrency and HIV in a university student population. More specifically I was interested in understanding students' attitudes and perceptions towards sexual concurrency in the era of HIV/AIDS. Over the past decade, sexually transmitted infections (STI) and especially HIV/AIDS have had an adverse effect on many societies with most survey studies referring to HIV/AIDS as a pandemic with no cure in sight for many affected individuals (Foss, Watts, Vickerman & Heise, 2004; Varga, 1997). A number of empirical studies have been conducted that seek to understand the epidemiology of STIs as well and to understand sexually unhealthy behaviours that are associated with STIs. Within the HIV/AIDS literature it has become particularly imperative to explore the role of concurrent – or overlapping sexual network structures in order to evaluate and determine the prevalence and spread of HIV in Southern African populations (e.g. Epstein & Morris, 2011; Kenyon & Zondo, 2011).

Statistics from UNAIDS (2011) state that although Sub-Saharan Africa contains 15.2% of the world's population, an alarming 69% of the world's adults and children living with HIV/AIDS reside in this region. A number of plausible explanations for the high prevalence of HIV/AIDS in Sub-Saharan Africa have been postulated and these include a) high use of recreational drugs and poor nutritional standards (Sawers & Stillwaggon, 2010), b) power disparities in gender relations (Jewkes, 2002) c) material sexual transaction (Hunter, 2002), and d) large disparities in socio-economic distributions (Kenyon, Zondo & Badri, 2010). In recent years, a key explanatory variable that has been identified by researchers as the driver of high HIV epidemic rates in Sub-Saharan Africa has been the spread of sexual concurrency

networks (Epstein & Morris, 2011; Kenyon & Zondo, 2011; Morris, Epstein & Wawer, 2010).

## **1.1 SEXUAL CONCURRENCY**

Within the HIV/AIDS literature, sexual concurrency is defined as having multiple sexual partners during an overlapping time period (Epstein & Morris, 2011; Lurie & Rosenthal, 2010; Wohlfeiler, 2005). This definition includes long term sexually concurrent partnerships, which can overlap for long periods (Epstein & Morris, 2011), to those that overlap for short periods of time (lasting a couple of months to a couple of days) (Epstein & Morris, 2011). According to Kenyon and Zondo (2011), prominent studies in the South African context continue to indicate a plausible relationship between concurrently organised sexual partnership and the spread of STIs, which needs further exploration so as to contribute to the point-prevalence policy debate around HIV and AIDS. Kenyon and Zondo cite a growing body of research on the role of sexual concurrency in South Africa, with one study (Johnson et al., 2009) indicating concurrency to be accountable for 74% of HIV infections in South Africa between the periods 1990 and 2000. Within the global literature it has also been highlighted that in comparison to serially monogamous relationships, HIV spreads more rapidly in sexual networks where more partnerships overlap over time (Lurie & Rosenthal, 2010). Within the literature on sexual concurrency networks, it has become common parlance that it is not the number of sexual partners over a given life span that accounts for the prominent epidemiological rates in the spread of HIV, but rather the manner in which sexual partnerships overlap with one another within sexual networks (Epstein & Morris, 2011; Kenyon & Zondo, 2011).

## 1.2 PROBLEM STATEMENT

According to the UNAIDS (2010) Global AIDS Epidemic Report on measurement and modelling of HIV sexual networks, it has become increasingly unreliable to rely solely on explicit self-measures (e.g. South African Demographic Health Surveys (DHS, 2003, 2007)); South African National Communication Survey (NCS) (Johnson et al., 2010) to study sexuality and sexual concurrency in Sub-Saharan Africa. According to the report and other literature on sexuality and sexual concurrency (e.g. Epstein, 2007; Epstein & Morris, 2011; Czopp, Monteith, Zimmerman & Lynam, 2004) new indicators are required to accurately measure sexual concurrency, especially among the youth population to gather a holistic understanding of sexuality and HIV concurrency. According to UNAIDS (2010), new and improved measures ought to be developed that are both simple and insightful and that can add value to our knowledge of sexual concurrency and HIV/AIDS in Sub-Saharan Africa.

Following from the above, it is imperative that new models and instruments be introduced to measure and supplement explicit self-measure surveys that seek to understand sexual concurrency amongst the youth, especially university students. The aim and objective of this study was to understand sexual concurrency among the youth and supplement explicit measures of sexual concurrency with implicit attitudes of sexual concurrency. Key scholars such as Czopp (2010), Greenwald and Banaji (1995) have suggested that implicit cognition appears to be an invaluable measure, and a reliable alternative to understanding sexual behaviour and attitudes towards sexuality, which cannot be directly measured by explicit questionnaires such as surveys. The idea of implicit attitudes, as described by Greenwald, McGhee and Schwartz (1998), views individuals not only as processing behaviour in explicit, or aware, controlled, reflective modes, but also in implicit or unaware, automatic, intuitive modes. More specifically, Greenwald and Banaji (1995, p.10) describe implicit attitudes as

“introspectively unidentified (or inaccurately identified) attributes of the self”. The idea of implicit cognition will be discussed later, in the dissertation’s theoretical framework. Based on the above, it is thus useful to examine the effect of implicit cognition in relation to sexual concurrency; to supplement existing explicit self-measures such as those done by other researchers (e.g. Kenyon & Zondo, 2011; Morris, Epstein & Wawer, 2010). Thus, this study will contribute towards theoretical and methodologically- new analysis.

### **1.3 AIMS AND OBJECTIVES OF THE RESEARCH**

From the above, it surfaces to state that the aim of my study was to add to the knowledge base on the understanding of HIV and sexual concurrency, by researching the implicit and explicit attitudes towards sexual concurrency among a South African student population.

In order to achieve the above, three main objectives were developed for this study, as follows:

1. To study and identify implicit attitudes towards sexual concurrency in a South African population using the IAT derived by Greenwald et al. (1998);
2. To understand if there is a positive correlation between the reported implicit and explicit attitudes towards sexual concurrency among the study’s participants; and
3. To determine if age and gender are key determinants of sexual concurrency in a student population.

### **1.4 OUTLINE OF THE DISSERTATION**

Following this chapter, which provides the context for the research the dissertation continues with a review of the pertinent literature in Chapter Two. The methodology employed to test the hypotheses of the study is discussed in Chapter Three, and the results that were generated

for this study are presented in Chapter Four. Finally, a deliberation of the results, and how they answer the hypotheses, is presented in Chapter Five.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This section of the dissertation presents the key literature that pertains to the objectives of this study. As a general outline, the review begins with a discussion on the Human Immunodeficiency Virus (HIV), and its prevalence in South Africa. The attitudes that exist in the country towards sex and HIV are then discussed, along with aspects that relate to the recent high-level policies and attitudes on HIV, as well as stigma and stigmatism towards HIV in South Africa. Public perceptions on HIV, including public knowledge, and the culturally derived perceptions of the population are then discussed, along with a case study on rural youth's understanding of HIV in South Africa.

Key to the study, sexual concurrency in the South African context is discussed. To make sense of attitudes towards sexuality, I then discuss and explore the cognitive processes that have been analysed to make sense of sexuality and cognition. The aim of the above discussion is to introduce the theoretical framework underpinning my research thesis (implicit cognition). As a conclusion to this chapter, the theoretical framework that undergirds my research is then discussed along with its relation to sexuality and sexual research.

#### **2.2 HIV INFECTION**

There are two distinct types of HIV that have been identified, which are termed HIV-1 and HIV-2 (Gao et al., 1999). The acquired immunodeficiency syndrome (AIDS) is the result of HIV-1 which is the predominant form found throughout the world. It is categorised into three distinct groups: M (major), O (outlier), and N (non M/non O, new) (Requejo, 2006). The M, N and O viruses are members of the lentivirus lineage, which also includes the simian

immunodeficiency virus strains that are able to infect non-human primates (Requejo, 2006). In the lentivirus lineage groups, M and N are more closely related than group O, which is distant from the other strains (Gao et al., 1999). It is believed that group M has spread worldwide and is the cause of the global AIDS pandemic; this group is further divided into 11 different subtypes: A to K (Requejo, 2006). The 11 subtypes of group M are geographically distinct, and clade A predominates in North America, whereas clade B predominates in Europe (Requejo, 2006). It is believed that clade C is linked to an estimated 50% of infections around the world and is ubiquitous in South Africa with 90% of South Africans being infected with this clade (Shankar et al., 2005; Singh 2012). HIV-2 is also classified into five subtypes, ranging from A to E, which are all equidistant from each other (Yamaguchi et al., 2004). In adults, the main route of transmission of HIV-1 is predominantly through heterosexual coital transmission. Among children, vertical transmission of HIV is the primary route of transmission of the virus (UNAIDS, 2011), which occurs when HIV is transmitted from mother to child; usually when HIV crosses the placenta (Coutsoudis et al., 2004).

### **2.2.1 Microbiology of HIV**

HIV is a retrovirus, in other words, it is a disease which needs cells from a host in order to replicate. It is different from other infectious diseases due to its systematic attack on CD4 T cells (Cichocki, 2011). The above CD4 T cells are used as a vital defence by the body to protect it from viruses (Belman et al., 1988). Two major types of T cells have been identified that are affected by the virus: CD4 (helper) and CD8 (suppressor) cells. CD4 cells initiate the body's response to infectious disease.

According to the medical literature, HIV uses CD4 cells as host cells for its replication (Cichocki, 2011). When HIV attaches to CD4 cells, these cells become damaged and depleted, possibly through an initial depletion of memory T-cells (Cichocki, 2011). It is

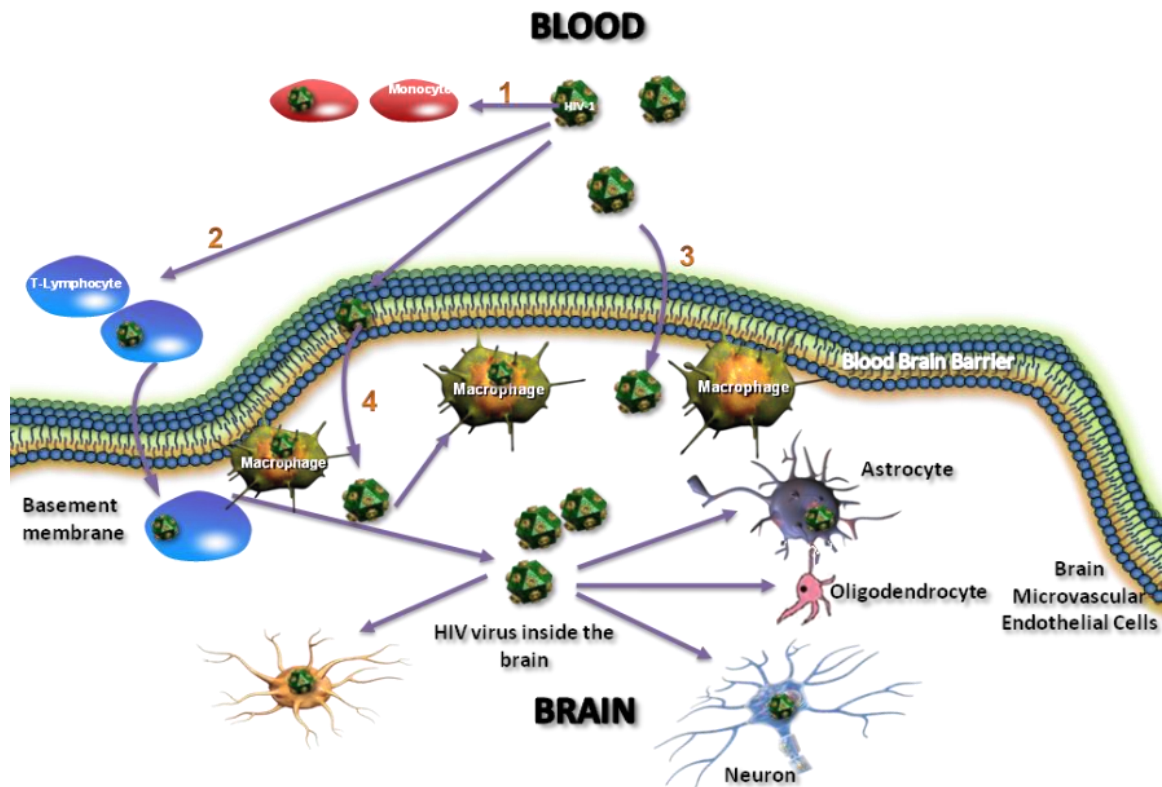
through the depletion of these cells that progressive immune deficiency develops, which results in a compromised immune system to fight the HIV virus, leading to opportunistic infections and illness (McArthur, Brew & Nath, 2005).

Once the HIV provirus attaches to the host-cell genome (CD4 T cells), it can remain latent for many years without causing cellular damage (McArthur, Steiner, Sacktor & Nath, 2010); however, when cell activation occurs, this produces retroviruses (RNA) (McArthur et al., 2005). Plasma HIV RNA level, or viral load is an indicator of the number of copies of HIV in the blood. Moreover, the CD4 cell count and plasma HIV RNA viral load are important predictors of the sequela of HIV disease progression.

### **2.2.2 Neurocognitive Effects of HIV and the Blood Brain Barrier**

Although not a key focus of my thesis; the below section briefly outlines the cognitive effects of HIV and its relation to the Blood Brain barrier. As an illustration, Figure 2.1 shows the Trojan Horse Effect and how HIV crosses the Blood Brain Barrier (BBB) (Saxena, Tiwari & Nair, 2013), which is summarised as follows:

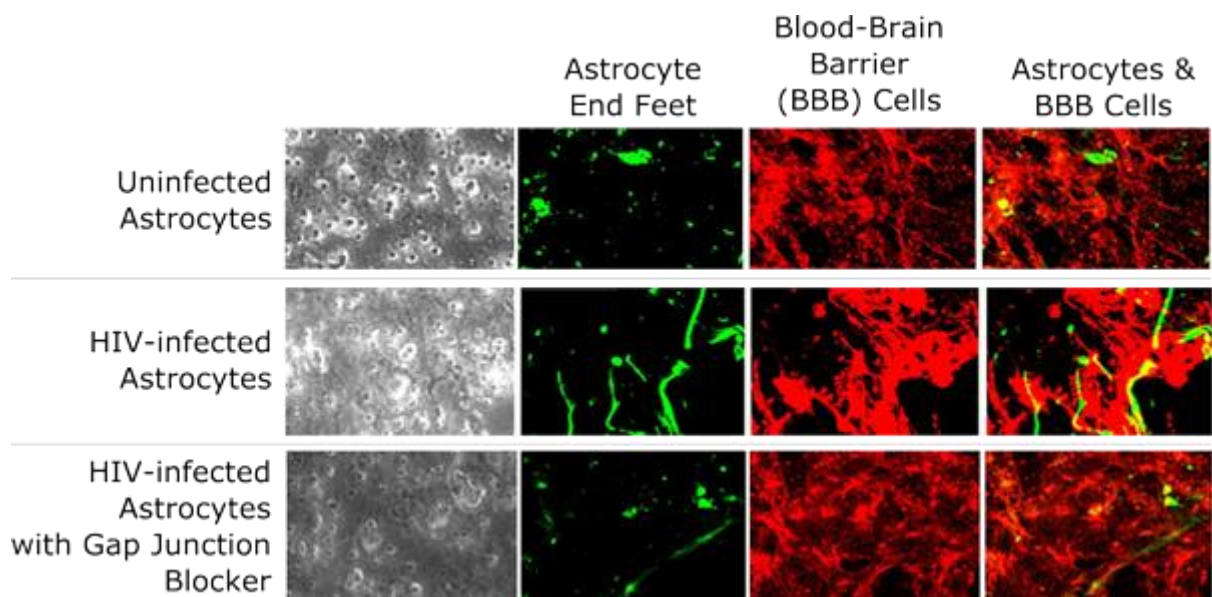
1. HIV is carried across the BBB by infected monocytes, which differentiate into macrophages;
1. Another probable cause is the direct entry of HIV through the BBB into the brain;
2. Entry of HIV through endothelial cells can pose another threat of HIV infection in the brain.



**Figure 1 The Trojan Horse Effect and how HIV crosses the BBB**

Source: Saxena, Tiwari & Nair, 2013.

The infection of astrocytes is limited and whether neurons and oligodendrocytes are infected is still unclear (Saxena et al., 2013). Figure 2 shows a microscopic view of HIV-infected and uninfected astrocytes. The middle row shows a staining technique which demonstrates how HIV interferes with the development of astrocyte end feet (green), disrupts the growth of cells in the BBB (red), and shows abnormal connections between astrocytes and the BBB (yellow and red) (Eugenie, Gaskill & Berman, 2009).



**Figure 2 Microscopic view of HIV-infected and uninfected astrocytes.**

Source: Eugenie et al., 2009.

### 2.2.3 Neurocognitive impairment following HIV infection

Neuropsychological deficits or neurocognitive disorders related to HIV were first observed in 1987, in a landmark study by Grant et al. (1987), when these authors found evidence for early involvement of the central nervous system (CNS) in AIDS and other HIV-related infections. Following this, considerable research has been conducted to characterise the effect of HIV on the brain, such as its neural and cognitive mechanisms, prevalence and incidence (neuroepidemiology), and real-world implications (Weber, Blackstone & Woods, 2013).

Otherwise referred to as HIV-associated neurocognitive disorders (HAND), such complications are indicated by a decline in everyday functioning, and mild-to-moderate, or moderate-to-severe neurocognitive deficiency, which can be directly attributable to HIV; and are said to occur in between 30% and 50% of HIV infected individuals (Heaton et al., 2010). Iudicello, Woods, Cattie, Doyle and Grant (2013, p. 256) concur that in nearly half of HAND

patients, individuals experience difficulties with daily activities, such as vocational difficulties, and “suboptimal medication adherence”.

Categorised into three main variants of HIV-Associated Dementia (HAD), Mild neurocognitive Disorder (MND) and Asymptomatic Neurocognitive Impairment (ANI), the risk factors for HAND have been shown to include histories of immune suppression, older age, lower cognitive reserve, and various ‘comorbidities’ such as substance use disorders (Anand et al., 2010; Weber et al., 2013).

In a study by Weber, Woods, Cameron and Grant (2010), the authors studied the ability to perform mental rotation or to manipulate three-dimensional objects in space in a HIV infected population. Representing a neutrally complex element of spatial cognition, the authors studied the capacity of a sample of individuals to “detect, understand, manipulate and integrate visual stimuli” within the context of their environment (Weber et al., 2010, p. 115). These authors found that individuals who were HIV positive committed more errors on the rotation tasks than people from the seronegative control sample, and particularly those tasks that were associated with working memory and executive functions. In support of the aforementioned studies, research by Iudicello et al. (2013) on HIV infected individuals, both with and without HAND, and a seronegative control sample, observed that individuals infected with HIV performed more poorly on executive cognitive functions and tests measuring cognitive flexibility.

Due to the lack of a fully effective clinical pharmacotherapeutic treatment for HAND (ARVs have been shown not ameliorate cognitive decline due to HIV (Weber et al., 2013), researchers have begun to explore approaches that target behavioural and cognitive aspects of infected individuals (Weber et al., 2013). Since the above is not a key to my research; I briefly mention two studies that have pursued cognitive rehabilitation to remediate the effects of HIV

on cognitive functioning. Currently, cognitive rehabilitation treatment falls into two broad categories: (a) compensatory techniques and (b) restorative techniques. Compensatory cognitive rehabilitation approaches are applied in the event that corrective treatments are not possible. Compensation techniques attempt to support damaged cognitive processes with both external cues or reminders, or internal strategies such as “chunking” (Twamley, Jeste & Bellack, 2003, p. 359). On the other hand, restorative treatments rely on the concept of ‘neuroplasticity’, which advises “drilling and practicing” cognitive skills to improve neural organisation, and therefore increase the cognitive abilities of affected individuals (Wykes & Spaulding, 2011, p. S81).

The aforementioned treatments have shown varied potential. In a study by Becker et al. (2012), for example, the authors observed the use of a multi-domain computer-based cognitive stimulation software, ‘SmartBrain’, on a sample of 30 HIV-infected individuals, compared to a control sample of seronegative participants. The initial results revealed no significant improvement on global cognitive outcomes for either of the test groups, irrespective of HIV serostatus, though it should be noted that “adherence to the intervention was suboptimal [and] that only 54 % of participants were able to use the program more than once” (Becker et al., 2012, p. 1848).

On the contrary, in a study by Boivin et al. (2010), the use of the computerised cognitive rehabilitation training programme ‘Captain’s Log’ on 60 Ugandan children with high current HIV sero-statuses showed promising results (Weber et al., 2013). Although diagnosis with HAND in the sample had not been reported, significantly lower neurocognitive performance was evident at baseline, compared to the seronegative control group. However, following participation in the Captain’s Log sessions, the test group performed proportionally better than the controls on various challenges, including card detection speeds and maze learning

tasks (Boivin et al., 2010). Similar research on the cognitive rehabilitation of children in South Africa has been pursued at Rhodes University with some promising findings (please see Zondo & Mulder, 2015).

## **2.3 HIV EPIDEMIOLOGY**

According to Muthivhi, Sodi, Maunganidze and Mudhovozi (2011), young people are the most vulnerable age group to HIV to HIV infection in South Africa. According to the United Nations Youth Factsheet (United Nations, 2012) it is estimated that forty percent of all new HIV infections, globally, are among the youth (aged between 15 and 24). In addition to the above, it is estimated by The United Nations Population Fund (UNFPA, 2008) that 6000 young people are infected each day.

### **2.3.1 Prevalence of HIV in South Africa**

More specifically, to the South African context; there are more people infected with HIV in South Africa than there are “in any other country in the world” (Bogart et al., 2011, p. 181), and the prevalence of HIV in the black population group is drastically higher than any of the others. Nduna and Mendes (2010) maintain that the prevalence of HIV among African young women between the ages of 15 and 29 is also disproportionately high. Bogart et al. (2011) state that the youth — and especially females — are most affected by the virus, and as much as 8% of females between the ages of 15 and 19, and 27% of females between the ages of 20 and 24 have been measured to be HIV positive. This is in comparison to HIV infection rates of 0.3% and 7% in males of the same age groups.

According to Tun et al. (2012), men who have sex with men (MSM) in South Africa are also estimated to be at a higher risk for infection with HIV than other population demographics, with a prevalence of between 10 and 13%. Nduna and Mendes (2010) further state that the

prevalence of HIV among the white population has increased in the ten years from 2000 to 2009, with 2.4% of the white population being infected with HIV in 2000, and around 6% in 2009.

## **2.4 ATTITUDES TOWARDS SEX AND HIV**

### **2.4.1 Public discourses on HIV in South Africa**

According to Bogart et al. (2011), the government of South Africa did not develop a single comprehensive strategy for preventing HIV until 2000, and antiretroviral treatments (ARVs) were only officially undertaken by the government in 2003. As a direct result of these policies, various researchers have argued that many new HIV infections occurred, and the lives of hundreds of thousands of people were lost in South Africa due to HIV and AIDS, which would otherwise have been averted by the swift rollout of ARV treatments (Chigwedere & Essex, 2010; Gilbert & Selikow, 2011).

### **2.4.2 Cultural perceptions of HIV**

According to Liddell, Barrett and Bydawell (2005), the patterns of sexual risk behaviour in Southern Africa are complex and may be explained by the underlying cultural beliefs in the region, which are supposed to affect illness representation. Bogart et al. (2011) describe theories of illness representation, whereby people often use “lay theories to make sense of negative health outcomes” (pg.182) and to serve as a basis for the decisions they make regarding health-behaviour. These illness representations, which explain and assign meaning to the reasons for health outcomes, fluctuate relative to the apparent control that an individual has over an illness. For example, individuals may perceive an external (such as supernatural, or spiritual) entity to have a defining control over a health event, or they may perceive the

control factor to be an internal characteristic, such as genetics or personal effort (Bogart et al., 2011).

Liddell et al., (2005) further comment that illness representations in Sub-Saharan Africa are often emphasised through external entities and fatalistic factors including ancestral punishment or witchcraft, which in many cases are believed to be at the root of a variety of ailments, including AIDS. As example, in Zimbabwe, some individuals have blamed HIV and AIDS on conspiracies and sorcery. It has been argued, for example, that HIV was the brainchild of the racist whites, or the Americans; and that HIV is distributed by contaminating the lubricant in condoms (Rödlach, 2006). In Namibia, spiritual external perceptions have been discussed, which define HIV as “a punishment from God” (Mufune, 2005, p. 675). Moreover, ideas have arisen in Namibia that condoms are unreliable or not to be trusted, since government condoms are of a low quality and that manufacturers intentionally put holes in them; or that “condoms spread disease” (Mufune, 2005, p. 675).

### **2.4.3 HIV conspiracy**

While the high-level denial policies promoted by the recent South African government have since been officially retracted, opinions and perceptions are still lingering about the epidemic. According to Tun et al. (2012), South Africa has always received mixed messages and misinformation about HIV, as well as its origins, prevention and treatment. High profile public figures have even presented conflicting views that have contradicted the evidence-based information of the medical community and prominent HIV researchers (Niehaus & Jonsson, 2005).

Similarly, in a qualitative study by Bogart et al. (2011, p. 182), on perceptions regarding HIV in South Africa, it was found that a number of participants were inclined to blame “the

government, or racist whites for spreading HIV and withholding a cure”. In some cases, the authors report that men “did not use condoms because condoms were infected with ‘AIDS worms’” (Bogart et al., 2011, p. 182). Authors such as Niehaus and Jonsson (2005) attribute this public scepticism towards HIV to reports that the apartheid government allegedly attempted to develop antifertility or contraceptive drugs and biological weapons to control the black population.

#### **2.4.4 Gender, Power, HIV and Sexuality**

The study of HIV is multi-layered as it is further interwoven into power and gender relations. In post-apartheid South Africa, much evidence points to a “normative hyper-masculinity”, which places both men and women at risk of being infected with HIV (Gilbert & Selikow, 2011, p. 328). The “real man” has been portrayed as biologically programmed to have uncontrollable needs for frequent sex with various women, while the perception of manhood in many men also places them as superior, and justifies their refusal to use a condom (Gilbert & Selikow, 2011, p. 328). Selikow (2004) asserts that men feel as if condoms reduce their view of themselves as men, and weakens their sexuality. Gilbert and Selikow (2011, p.9) stress that this image of a “real man” often encourages multiple partners and sexual concurrency; and at times legitimises sexual violence.

Moreover, power motivation in men has been found, for example, to correlate with a greater number of sexual partners, early age of first indulging in intercourse and coercive sexual behaviour (Zurbruggen, 2011). Conversely, women high in power motivation have been seen to have a higher correlation with having engaged in recent sexual intercourse (within the past 24 hours) (Schultheiss et al., 2003). In the same study by Schultheiss et al. (2003), affiliation-intimacy motivation was seen to correlate negatively with recent sexual intercourse in both men and women.

In terms of sexual attitudes (as opposed to just sexual behaviours), men who present a high power motivation have been seen to correlate highly with a preference for endorsing casual sex, and a preference for dating multiple partners; while power motivated women have shown a preference for dating one main partner, though reserving the liberty to date others as well (Hofer, et al., 2010). In contrast, men high in affiliation-intimacy motivation have been observed to correlate negatively with the endorsement of casual sex (Yost & Zurbruggen, cited in Zurbruggen, 2011).

#### **2.4.5 HIV stigmatisation in South Africa**

Maughan-Brown (2006) argues that stigma related to HIV and AIDS can have consequences from a public health perspective, and be damaging to the quality of life of individuals living with HIV. However, combating stigma is understood to be a very difficult issue, because, as in the cases of epidemics of the past, such as polio, cholera and leprosy, the stigma related to HIV and AIDS is founded in deep-rooted anxieties and social fears (Maughan-Brown, 2006). Maughan-Brown (2006, p. 166) defines HIV or AIDS-related stigma as “any negative meanings or set of values associated with someone having, or being perceived as having, HIV/AIDS.”

Maughan-Brown (2006) also describes stigma in three forms, namely symbolic stigma, instrumental stigma, and resource-based stigma. The first is based on the condemnatory belief that those who have been infected with HIV have brought the affliction upon themselves through irresponsible or immoral behaviour, and this is predisposed upon suppositions on the ways in which it is transmitted, or the people who get it (Herek, 2002). Instrumental stigma is founded on the psychological necessity to protect oneself, and considers the real physical and potentially terminal nature of the disease, and its associated risk. This stigma arises from the opinion that interacting with an HIV positive individual would pose a direct threat to one’s own wellbeing. Finally, resource-based stigma is founded on the utilitarian principle of self-

interest, where people without HIV resent the distribution of what they perceive to be limited resources, to those who have HIV (Maughan-Brown, 2006).

A study by Kenyon, Dlamini, Boulle, White and Badri (2009) found the levels of stigma towards people infected with HIV to be higher among the white and coloured populations in South Africa. In a study by Maughan-Brown (2006) on stigma associated with HIV in Cape Town, the author found that young adults rarely showed any significant negative behaviour towards HIV infected individuals, though most people did present some propensity to discriminate against those infected with HIV. Maughan-Brown (2006) observed the most significant determinant of whether a person would show stigmatism was their understanding HIV transmission, or the lack thereof; and recommended the enhancement of HIV and AIDS education programmes as a means of minimising stigmatism.

## **2.5 YOUTH PERCEPTIONS OF HIV AND HIV KNOWLEDGE**

Various studies have focused on youth and their understanding of sexuality and HIV. In a paper by Nduna and Mendez (2010), various stereotypical opinions of young South African's were explored, in relation to the current issues on HIV, AIDS discourse and sexual practices. From their study, black youths were believed to be ignorant of HIV prevention, which was attributed to conservative family values, illiteracy, and the "backwardness of the culture" (Nduna & Mendez, 2010, p. 23). The white youths in South Africa appeared to be unpretentiously confident, with a perceived invulnerability which was based on an illusionary biological immunity, founded on the principle that HIV prevalence among the white communities was lower, and that it was "rare for the white participants to know someone with HIV or AIDS" (Nduna & Mendez, 2010, p. 24).

In a more recent study by Muthivhi et al. (2011), despite having access to several information sources on HIV and AIDS, the youths were still not aware of some of the means by which HIV was transmitted, aside from a basic knowledge on the sexual transmission of the virus. They did not appear to have much knowledge, for example, on the vertical transmission of the virus (“from mother to child in utero, around the time of birth, and postpartum as a result of breastfeeding”) (Tóth, Bácsi, Beck & Szabó, 2001). Harrison, Newell, Imrie and Hoddinott (2010) attributed this knowledge shortfall in sexually transmitted diseases, to a lack of co-ordination on information transfer to the youth in South Africa on reproductive health.

Nduna and Mendez (2010) highlighted findings in their study that condom use by the black youth was low due to issues with the financial burden of purchasing condoms; while the condoms freely distributed by the government were dismissed as unsafe and unreliable.

In terms of the attitudes of the youth towards HIV in South Africa, the study done by Muthivhi et al. (2011) on 200 male and female learners between 14 and 28 years of age in rural village schools, some interesting findings were apparent. It was observed that a third of the learners would care for a family member with AIDS, and a fifth would care for a friend. Only 17.5% would purchase food from a shopkeeper who they knew was HIV positive, and 15% believed that children with HIV should be kept away from other children to prevent infection. In 5% of cases, respondents went so far as to claim that it was a waste of money and resources to train and employ people with HIV.

Regarding its transmission and prevention, a third of the learners perceived the sharing of injection needles to be the highest means through which HIV was transmitted, while a quarter of respondents stated unprotected sex was the most common mode of transmission. In 35% of responses, learners listed that HIV could only be transmitted as a result of unprotected sex, and only 20% of the study participants noted vertical transmission from mother to child as a

mode of transmission. There were also misconceptions among some learners about the possibility of contracting HIV from using the same toilet as a person with HIV (Muthivhi et al., 2011).

Learners in the Muthivhi et al. (2011) study indicated condom use as the most important method of preventing HIV infections, while a quarter described having fewer sexual partners. It was noted by 15% of learners that there is a cure for AIDS, and 10% of learners described the disease as “God’s way to punish sinners” (p. 586). Though in small proportions, 5% of learners believed “that AIDS is caused by witchcraft”, and that having sex with a virgin could cure AIDS. Five percent also thought that “HIV does not cause AIDS.” In addition, among as many as 10% of learners it was thought that a person should first get TB in order to become infected with HIV. When asked about living with HIV and AIDS and medication, up to 15% of learners thought that the use of “a lot of medications with side effects” would make life difficult (Muthivhi et al., 2011, p. 586).

According to Muthivhi et al. (2011), resolving discrepancies and gaps in the knowledge of the youth on HIV and AIDS, and improving their attitudes towards HIV is an education issue. They argue that this could be resolved by issuing more educational programmes in schools on the topics of life skills, and HIV/AIDS; as well as through printed brochures, advocacy and information workshops, and additional HIV and AIDS awareness materials. They assert that the current methods of disseminating knowledge are insufficient to protect the South African youth, because “some South Africans are constructing their sexual identity and their safety from [HIV] infection in terms of competing knowledge systems ... and within contexts that produce, reproduce and send conflicting messages to the youth” (Muthivhi et al., 2011, p. 587). Muthivhi et al (2011) conclude their study by stating that further research ought to be pursued on youth both in rural and urban settings.

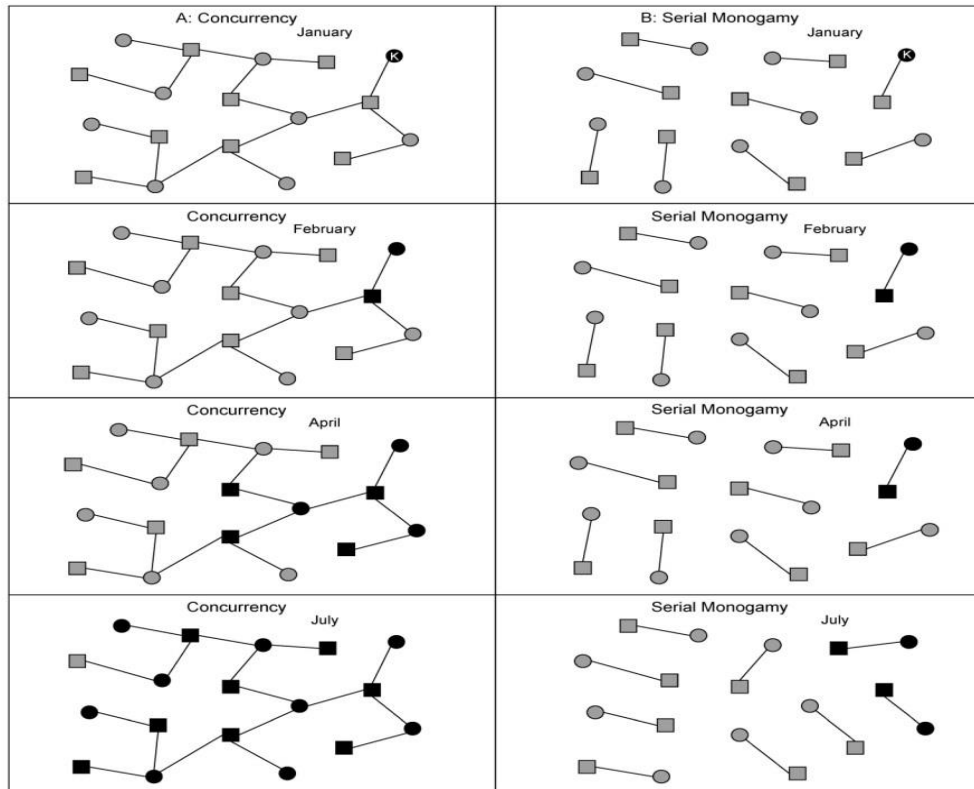
Others such as Dawood, Bhagwanjee, Govender and Chohan (2006) have proposed a different approach, and recommend that targeting HIV and AIDS should be done by building and sustaining the family structure, as well as through partnerships between families and schools, businesses, religious groups and other community groups.

The above sections have looked at the perceptions of the youth towards HIV, and their knowledge of HIV. Having laid down some views and perceptions of HIV, I now move on to discuss the key area of study for my thesis; sexual concurrency.

## **2.6 Sexual concurrency**

Mah and Halperin (2010) define sexual concurrency as having overlapping sexual partnerships in time, and starting a new partnership before an existing one terminates. Gilbert and Selikow (2011, p. 329) note that multiple and concurrent sexual partnerships (MCP) link individuals into a “sexual network”, while Epstein (2007) refers to these sexual networks as a ‘superhighway’ for the transmission of HIV. These ‘superhighway’ connections are distinct from serial monogamous relationships that may last after a period of time.

To illustrate, Figure 2.3 illustrates the difference in HIV spread between serial monogamous relationships and sexual concurrency relationships. As explained by Kenyon et al. (2009), in a serial monogamous relationship, “concurrency-induced connected component” (CICC) is never greater than two, while in sexual concurrent relationships, this value can become very large. Furthermore, since the infectious transmissibility of HIV is heightened by between 10 and 40 times during the acute infection phase of the disease (Wawer et al., 2005), as soon as one person is infected in a sexually concurrent network, all of the other members of the network are at a radically increased risk of being exposed (Kenyon et al., 2009).



**Figure 3 Network diagram of a model of HIV transmission over time on two hypothetical populations with population ‘A’ being sexually concurrent and population ‘B’ being serially monogamous**

Source: Kenyon et al., 2009, p. 249

To expand on the “superhighway” analogy of HIV transmission through sexual concurrency, it is worthwhile to describe the research conducted by Morris and Kretzschmar (1997), leading researchers in the field of HIV sexual concurrency. In a study conducted by the above researchers, the authors sort to study the spread of HIV as modelled across two populations with sexually diverse characteristics. One population was characterised by long-term MCP and the other by serial monogamy. Most importantly; the study was analysed in a manner that preserved the same total number of sexual relationships in each of the two populations, so as to maintain the same number total number of sexual relationships. As was to be expected, the prevalence of HIV in the sexually concurrent population was ten-times higher after five years,

which was directly attributed to the “concurrency-induced connected component” (CICC) of the concurrent population (Morris & Kretzschmar, 1997).

### **2.7.1 Sexual concurrency in South Africa**

According to Thornton (2009), multiple and concurrent sexual partnerships are a prevalent aspect of relationships in Southern Africa, and this has been recognised as a main factor in the spread of HIV in the region. Bogart et al. (2011, p. 181) assert that considerable risk of exposure exists in South Africa due to MCP, which is perceived to be “normative” among many (usually male) black South Africans. In a survey conducted on an urban settlement in South Africa, it was found that 9% of women, and 29% of men had had one or more sexual partners in the last year, outside of their primary relationships (Boule et al., 2008).

Shisana et al. (2009) reported an increasing prevalence of MCP in young males between 2002 and 2008 (23%), 2005 (27.2%) and 2008 (30.8%)), suggesting that males had increasingly more than one sexual partner with each yearly cycle. Conversely, the prevalence of MCP among females over the same periods appeared to be declining for females (8.8%, 6% and 6% respectively).

Prevalence of sexual concurrency based on a study by Kenyon et al. (2009) on individuals in the Cape region of South Africa, aged between 14 and 22 years using the Cape Area Panel Study (CAPS) dataset, found that significant differences existed between the different demographic groups. Black males were reported to have had considerably higher concurrency rates than coloured or white males, in proportions of 41%, 21% and 5% respectively. The corresponding rates in females were 19%, 3% and 6% respectively across the same racial groups. Interestingly, in the same study, when asked their views about multiple sexual

partnerships before they got married, only 4% of black study participants thought that having multiple sexual partners before they got married was acceptable, compared to 25% in whites.

The black participants in the Kenyon et al. (2009) study who admitted to having engaged in high-risk activities — such as having a concurrent relationship, a partner who they knew was having a concurrent relationship, or three or more lifetime sexual partners — believed they were less at risk of being infected with HIV than the coloured and white demographic groups, in proportions of 41%, 71% and 70% respectively.

Other research by Harrison, Cleland and Frohlich (2008), Harrison and O’Sullivan (2010), and Lurie and Rosenthal (2010) has helped to further quantify the nature of sexual concurrency in South Africa. By studying young people’s sexual partnerships in KwaZulu Natal, Harrison et al. (2008) observed that one-third of the men in their study reported having had multiple or concurrent partners. These researchers also observed a correlation between non-participation in schooling or civic organisations and higher risk partnerships for women; although this did not appear to be the case for men. On average, Harrison et al. (2008, p. 295) found that the relationships of their respondents were frequently characterised as “serious”, and lasted for more than a year for both men and women.

A later, two-staged study by Harrison and O’Sullivan (2010), on 47 young adults aged between 18 and 24 — also in KwaZulu Natal — found that primary relationships appeared to be long-lasting, with most participants (both men and women) still being in the same relationships at the second stage of the study, two-years on. The study found, however, that secondary, casual partnerships were common for both men and women; though these relationships were seen to be shorter and frequently changed. It was also perceived that marriage and love aspirations were not “incompatible with secondary partnerships” (p.1).

Harrison and O'Sullivan (2010) found that condom use was varied among primary relationships, but was nearly universal among secondary partners.

There has also been much debate on the true effect of sexual concurrency on HIV and AIDS. Regarding whether concurrent partnerships are a driver of the HIV Epidemic in sub-Saharan Africa, Lurie and Rosenthal (2010, p.17) concluded that "the evidence is limited". They argued that, at the time of their study, there was no conclusive evidence to prove that concurrency was increasing the size of the HIV epidemic, nor increasing the speed of HIV transmission. Indeed, they concluded that there was no conclusive evidence to prove that concurrency was even associated with HIV prevalence; or that it was increasing the persistence of HIV in the sub-Saharan African population. They asserted, however, that it was certainly feasible that concurrency could theoretically play a primary role in transmitting HIV through sexual networks, but that there was insufficient evidence to claim that it *had* played that role.

Lurie and Rosenthal (2010, p.17) supported their argument by stating that there is little evidence indicating "any dramatic difference in sexual behaviour in Africa, compared to the rest of the world, nor that sexual behaviour in Africa is different in countries with high versus low HIV prevalence". They did state, though, that additional studies would be needed to definitively answer this question.

Similar research by Sawers and Stillwaggon (2010, p. 13), found that "the notion that concurrent sexual partnerships are especially common in sub-Saharan Africa and explain the region's high HIV prevalence" is unfounded, although it is accepted by many as "conventional wisdom". These researchers argued that "research seeking to establish a statistical correlation between concurrency and HIV prevalence either finds no correlation or has important limitations."

In recent research, though, such as by Kenyon, Buyze and Colebunders (2013), such interesting co-variations between concurrency and HIV prevalence have continued to be observed. Arguing that “HIV prevalence differs by more than an order of magnitude between South Africa’s racial groups”, their study on five nationally representative survey samples found evidence to support the relation between concurrency and the country’s trends in HIV infection. Kenyon et al. (2013, p. 1) argue that much of the differing prevalences of HIV between the country’s racial groups could be explained by the differences that exist in the sexual behaviours of these racial groups, specifically in terms of the “prevalence of concurrency and the number of sexual partners in particular”.

### **2.7.2 Research on university students’ attitudes towards HIV, condom use and sexual concurrency**

Since this study focuses on sexual concurrency among university students, it is valuable to review some studies that have focused specifically on university students.

In a study by Psaki, Ayivi-Guedehoussou and Halperin (2013), 12 focus groups were conducted with male and female students enrolled at the University of KwaZulu-Natal. They examined the gender norms that underpin the apparent widespread acceptance of concurrent sexual partnerships, by focussing on the attitudes and behaviours of the students towards concurrency. The findings of the study were that concurrent sexual partnerships were standard among the male students and “increasingly common” (p. 369) among the female students. They also observed that the primary female motives for concurrency were “material gain and changes in women's perceptions of their roles and power in relationships” (p. 369). In men, the primary motives for concurrency were a perceived innate need, peer pressure, and a fear of being alone. Interestingly, the study found that the female students often knew that their partners were cheating, but stayed with them for financial reasons, because they believed that

they were “the most important partner”, or because they were concerned that they would “not find another partner”.

With regard to condom use among university students, Mulwo, Tomaselli and Dalrymple (2009) performed a study on the perceptions of HIV prevention and condom efficacy at three universities in KwaZulu-Natal. They found that the public sector condoms were perceived as smelly and ineffective, and at times infectious. Another perception was that the public sector condoms were of a lower status than commercially available brands, and these perceptions were seen to influence whether the students engaged in unprotected sex, instead of using the government-issued condoms.

In the Mulwo et al. (2009, p. 317) study, for example, one participant reported that “women preferred to have *skhunu* a slang word for unprotected sex, instead of using public sector condoms”. The respondent noted:

*“Most of these chics doesn’t [sic] like these condoms, they are saying that – You won’t have it with me with the Choice, (government condom) no you must go and buy some condoms. You are like wow, I doesn’t [sic] have them so what must I do? And they say [to myself] aii, you must maybe end up having skhunu here, like flesh to flesh (p. 317).”*

Interestingly, condom use was observed to be less common among primary partners, than when short-term or casual partners were involved: the above finding has further implications on HIV and STIs. It is thus important for researchers to further explore and understand the cognitive processes regulating decision making around sexuality and sexual concurrency.

## **2.8 UNDERSTANDING HIV/STI SPREAD AND COGNITIVE PROCESSES**

This section of the literature review discusses cognitive processes, and how these relate to the spread of HIV. This is important for two main reasons. Firstly, the cognitive process is important because aspects such as affective decision making processes, emotions, and implicit motives are all involved in human behaviour, which as discussed during this section, are indicators of risk for HIV. Secondly, understanding cognitive processes is important because studies that are performed to understand human sexual practices and sexual concurrency often use questionnaires or instruments that target the cognitive processes of their study's participants (Dariotis, Pleck, Sonenstein, Astone & Safikis, 2009). For example, as noted by Dariotis et al. (2009), self-reports are a standard measure of sexual history used in survey research.

However, it has been shown that the accuracy of self-reporting is often questionable, and questionnaires are often deemed unreliable in measuring sexuality, since the conditions and behaviours of respondents' self-reports can be affected by reporting errors such as perceived costs on social desirability, misunderstanding of questions, memory failure, or other such factors (Dariotis et al., 2009). Therefore, other measures and instruments are often needed in sexuality research to increase the reliability of a study (Greenwald et al., 1998). These aforementioned concepts will be discussed in the remainder of the chapter.

### **2.8.1 Overview of cognitive processes**

The cognitive processes associated with decision-making may be observed along a 'spectrum', which ranges from the deliberative or explicit at one end, to the spontaneous or implicit at the other (De Houwer, Teige-Mocigemba, Spruyt & Moors, 2009). Explicit cognitive processes are aware, controlled, or reflective, while implicit cognitive processes are

unaware, automatic or intuitive. The implicit processes at one end of the spectrum are fast, parallel, associative and relatively effortless, and are largely influenced by associations in memory (Grenard, Ames & Stacy, 2013; Kahneman, 2003).

Spontaneous or automatic associative processes are developed gradually over time, from experiences with “reinforcing events” (Ames, Grenard & Stacy, 2013, p. 915). Thus, functional changes occur gradually in the brain, such as associative learning processes, which result from the reinforcement that occurs through action or behaviour. Spontaneous processes are those involved with, for example, the linear judgments of financial decisions — as delineated by the Prospect Theory (Kahneman, 2003); or the framing effects associated with survey administration (Grenard et al. 2013). As associations are reinforced through sustained behaviour, so the patterns of associations begin to signal and drive behaviour with less and less need for controlled processes (Ames et al., 2013).

The associations that are related to sexual behaviours, such as meeting new people at a bar may become “more accessible in memory in certain contexts”, and according to Grenard et al. (2013, p. 95), decisions about performing risky behaviours can be strongly influenced by the accessibility of memories for a person’s past sexual experiences. Thus, cues that are strongly associated with a practise — such as sexual behaviour — can activate an “automatic pattern of activation in memory” that in turn promotes and influences that behaviour (Ames et al., 915). Ames et al. (2013, p. 915) assert that although the associations that drive risky behaviour are typically activated spontaneously, they are not always transformed into behaviour, due to “the potential influence of protective executive control functions”.

The explicit or deliberative process of the cognitive decision-making process at the other end of the spectrum is slow, serial, rule-governed and effortful; and relies on executive functions such as retrieving past experiences and knowledge from memory, maintaining options and

goals in the short-term memory, and controlling attention during decision-making (Kahneman, 2003). Below, I briefly describe some cognitive processes that have been utilised to study sexual behaviour.

### **2.8.2 Meta-cognition**

Flavell (1976) describes meta-cognition as “one’s knowledge concerning one’s own cognitive processes and products or anything related to them.” It covers “the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective”.

Meta-cognitive processes have frequently been depicted as explicit processes, involving “deliberative reasoning”; though there has been mounting evidence that these processes may not be completely explicit (Sun & Mathews, 2012, p. 110). Reder (1996), for instance, maintains that in some cases, though the strategies could be explicitly learned and/or explicit, the selection of these strategies may be implicit. This is because, to avoid utilising limited cognitive resources in the brain such as attention, and thus interfering with regular mental processing, meta-cognitive processes would likely be implicit processes.

Sun, Zhang and Mathews (2006) argue instead that meta-cognitive knowledge is neither fully implicit nor explicit, but rather a combination of both explicit and implicit processes — as is the case for regular cognitive processes. They also assert that meta-cognitive knowledge, in either its implicit or explicit form, is not dissimilar from regular knowledge (Sun et al., 2006).

### **2.8.3 Affective decision making**

Decision-making has been defined by Bechara, Damasio and Damasio (2000, p. 295) as “a complex cognitive and affective process involved in the ability to select the most

advantageous response from an array of possible behavioural choices.” According to Ames et al. (2013), affective decision-making (ADM) is a specific, important part of higher order executive control function. ADM is functionally distinct from other executive control functions, and reflects an integration of both affective and cognitive systems, as well as the capacity to weigh the chances of long-term losses or gains more effectively against short-term gains, as well as the likely outcomes of an action.

When risky situations are met, some executive inhibitory functions can perform a protective role; however, an imbalance of executive systems can result in problems with regulating behaviour, which can even aggravate the risk (Ames et al., 2013).

### ***2.8.3.1 The Iowa Gambling Task (IGT)***

Ames et al. (2013) describe the Iowa Gambling Task (IGT), developed by Bechara, Damasio, Damasio and Anderson (1994), which is a frequently used neuropsychological test for observing decision-making that involves reward processes. Iudicello et al. (2013) concur that IGT is one of the most widely used measures of decision-making, based on laboratory techniques. IGT was developed to simulate decision-making in a real-life setting by integrating aspects such as punishments and rewards, implicit rule learning, uncertainty and response to feedback (Iudicello et al., 2013; Bechara et al., 2000).

The procedure of the IGT entails the inclusion of participants who make selections sequentially from one of four card decks, and the outcome of each selection is awarded either a prize as a specified amount of money, or may spontaneously result in a penalty that varies in frequency and size across the card decks (Bechara et al., 1994). Participants are instructed to attempt to maximise their profits following a sequence of 100 trials; whereby, participants must learn during the task that two of the decks are ‘risky’, and ultimately disadvantageous,

and two of the decks are safe, or advantageous (Bechara et al., 2000; Iudicello et al., 2013). The risky decks are characterised by higher potential gains from any single selection, but higher occasional penalties, while the safe decks are characterised by lower potential gains from any single selection, but fewer occasional penalties. Impairment in the decision-making process is characterised by individuals making disproportionately more selections from the risky decks over time, compared to healthy test subjects, and the test has been used to observe a wide variety of clinical conditions (Iudicello et al., 2013).

In a study by Ames et al. (2013), it was found that drug offenders who scored higher in ADM were considerably protected from the predictive effects of spontaneous sexual associations that would promote risky sex. Conversely, spontaneous sexual associations among drug offenders with reduced ADM ability were more strongly predicted to be risky, such as through a greater number of sexual partners, or condom non-use.

With regard to sexuality, studies using the IGT have some worthy findings. In a study by Wardle, Gonzalez, Bechara and Martin-Thormeyer (2010), ADM was found, along with emotional distress, to predict risky sexual behaviours among substance dependent HIV positive individuals. ADM independently, however, did not predict risky sexual behaviour.

As noted by Iudicello et al. (2013), HIV positive individuals both with and without disorders of substance abuse have shown deficits when tested using IGT. Based on the results of various studies, although HIV positive individuals perform similarly to control sample individuals who are seronegative during the early stages of the IGT task, as the task progresses they make disproportionately more selections from disadvantageous, or risky decks in the later stages of the task. According to Hardy, Hinkin, Levine, Castellon and Lam (2006), HIV positive individuals may find it difficult to prevent risky choices, because of

difficulties remembering the infrequent but hefty penalties that result from their selections, and/or a lower inhibition to the appeal of higher rewards.

According to studies such as by Wardle et al. (2010, p. 1110), IGT performance has not been seen to be strongly related to other aspects of executive functions, working memory, or attention in HIV positive patients, suggesting that the core cognitive processes at work in the decision-making process are relatively “dissociable” from those measured by current neuropsychological tests.

Lastly, Wardle et al. (2010), and Gonzalez et al. (2005) studied the role of the decision-making process in the association between emotional distress and sensation-seeking, or negative and positive emotional states respectively, and the undertaking of risky sexual behaviours. These groups of authors observed that greater emotional stress and heightened sensation-seeking were predictors of riskier sexual behaviours, but only in individuals who were both HIV positive, and who demonstrated “intact performance” during the IGT. The results of these studies were interpreted to suggest that there could be a significant association between the functional outcomes in HIV, and the decision-making process, though this may only be the case when the neural circuitry at the core of ADM is intact.

#### **2.8.4 Implicit motives**

According to Zurbruggen (2011), implicit motives are an important element of personality, and following assessment through content analysis, they have proven to be relevant on diverse fields such as entrepreneurship, leadership, health, emotion, and sexuality studies. Implicit motives are thought to have a considerably “affectively toned, goal-oriented cognitive network”, and are essentially inaccessible to the conscious awareness. Implicit motives, unlike self-attributed motives, are thought to be particularly useful in predicting behavioural

trends over time, including “operant” or unstructured behaviours (Zurbruggen, 2011, p. 535). In this framework, implicit motives, moreover, are said to be core drivers of behaviour, as they operate in relation with other elements of personality, such as cognitive schemas and personality traits (Winter, John, Stewart, Klohnen & Duncan, 1998). Of the diverse implicit motives and cognitive processes of implicit attitudes; the most germane to my research is implicit cognition and sexual behaviour.

## **2.9 IMPLICIT COGNITION AND SEXUAL BEHAVIOUR**

Various research has been conducted on implicit cognition and sexual behaviour, such as the implicit attitudes that exist towards close interpersonal relationships and sexual arousal (Ponseti & Bosinski, 2010), sexual orientation, and the assessment of HIV risk in romantic relationships (Harman, O’Grady & Wilson, 2009; Grenard et al., 2013). Ames et al. (2013, p. 914) argue that undertaking risky sexual behaviour, such as having multiple sexual partners or non-condom use, which can have potentially harmful outcomes — and continuing to engage in such activities while being aware of the risks involved — presents “prototypical irrational decision-making”. According to Ames et al. (2013), such behaviour is believed to result from the interplay between non-consciously, and consciously mediated processes, that are sustained by independent, but interacting neural systems. Grenard et al. (2013, p. 95) further argue that HIV risk behaviour is thought to be influenced by two independent cognitive processes, in a “dual process”.

### **2.9.1 Implicit motives and the relationship to sexual behaviour**

Implicit motives have been shown by authors such as Stanton and Schultheiss (2007) and Schultheiss, Dargel and Rohde (2003) to relate to the sex hormones oestradiol, progesterone and testosterone, which underlie sexual behaviour. There have been various studies such as

those by Gebhardt and colleagues that have implicated the involvement of implicit motives in sexual behaviour, and in particular, risky sexual behaviour (Gebhardt, Kuyper&Greunsvan, 2003).

The role of implicit motives in sexual behaviour is affected by various factors, and although correlations have been seen to exist between motives and sexual attitudes or behaviours, various moderating factors are known to affect the actions that a person takes to satisfy their primary motive (Zurbruggen, 2011). This includes, for example, a person's knowledge, experiences, skills, or other aspects of a person's personality, such as their attitudes, traits and immediate social or physical contexts. Zurbruggen (2011, p. 539) also asserts that sexual behaviours may be "heavily socialised and subject to internalised proscriptions", since implicit motivations are partly unconscious. Thus, sexuality is likely to be shaped by the "internalised proscriptive norms" that vary between environments and across different international locations.

## **2.10 THE IAT AND SEXUAL RESEARCH**

While studies relating to sexual research often use tools for interrogating explicit cognitions, other measures and instruments are often needed in sexuality research to increase the reliability of a study (Greenwald & Banaji, 1995). In studies on cognitive processes, one instrument that has been developed to observe implicit cognitions is the Implicit Association Test (IAT) (Greenwald et al., 1998). As noted by Dariotis et al. (2009), no single method of self-reporting is perfect, and questionnaires that aim to gather information using explicit cognitive processes have inherent shortcomings. Techniques such as the IAT are therefore used as a method of triangulation, to provide insight into the implicit cognitive processes of subjects.

The IAT was designed by Anthony Greenwald, Debbie McGhee and Jordan Swartz in 1998. The IAT measures strengths of automatic associations and is able to access ‘hidden’ attitudes that participants may not readily disclose in an explicit measure (Fazio & Olson, 2003). As such, implicit attitudes are said to refer to the positive or negative evaluations that a person has towards any occurrence that he/she encounters without active processing of that phenomenon. Thus, according to Greenwald et al. (1998), implicit attitudes are attitudes that an individual processes without being aware of this processing. Explicit attitudes are instead said to be evaluations or attitudes that require active awareness, and which are later acted upon (Greenwald et al., 1998).

The central thesis underlying the IAT is that individuals should respond quickly when asked to emit the same response for two concepts that are closely associated in memory, but should respond more slowly when the two concepts are not associated. The advantage of this instrument is that it may reveal certain attitudes that participants may or may not be aware of as it is conducted on a computer and participants might be more honest than on an explicit questionnaire where they may not wish to disclose their true feelings out of wanting to give desirable answers (Greenwald & Banaji, 1995).

### **2.10.1 IAT procedure**

Greenwald et al. (1998, p. 1468) describe the typical IAT procedure in this way:

“In the IAT, a subject responds to a series of items that are to be classified onto four categories – typically, two representing a concept discrimination such as *flowers* versus *insects* and two representing an attribute discrimination such as *pleasant* versus *unpleasant* valence. Subjects are asked to respond rapidly with a right-hand key press to items representing one concept and one attribute (e.g. *insects* and *unpleasant*), and with a left-hand key press to items from the remaining two categories (e.g. *flowers* and *unpleasant*). Subjects then perform a second task in which the key assignments for one of

the valences is switched (such that *flowers* and *unpleasant* share a response, likewise *insects* and *unpleasant*). The IAT produces measures derived from latencies of responses to these two tasks. These measures are interpreted in terms of association strengths by assuming that the subjects respond more rapidly when the concept and attribute mapped onto the same response are strongly associated (e.g. *flowers* and *pleasant*) than when they are weakly associated (e.g. *insects* and *pleasant*)”.

As a background to the IAT, the first application of the original IAT by Greenwald et al. (1998) was that a statistical difference was observed in the associations of white names with positive attributes and black names with negative attributes; the study sought to study hidden racist tendencies amongst research participants (Kaufman, 2011). To illustrate, twenty-five pleasant meaning words and twenty-five unpleasant meaning words were paired with either black or white names to compare the results to those found in an explicit measure. The IAT was able to reveal that there was an IAT-effect, or preference for white names paired with pleasant meaning words among the white respondents, and a preference for black names paired with pleasant meaning words among the black respondents (Greenwald et al., 1998).

### **2.10.2 Application of the IAT in Sexual Behaviour Research**

Emanating from the early success of the IAT, various research has been performed as a means of observing implicit cognitive associations relating to sexual behaviours. Czopp, Monteith, Zimmerman and Lynam (2004), for example, performed an Implicit Associations study to assess implicit and explicit attitudes to condom use based on sexual context. The researchers presented participants with various cues for protective sex over cues for risky sex and studied whether participants would use a condom in a protective environment over a risky environment. Czopp et al (2004) were able to predict the likelihood of condom use was greater in casual sex setting over protective monogamous settings with the IAT. In another study — also on implicit cognition and condom use — Marsh, Johnson, and Scott Sheldon

(2001) performed an IAT on a sample of respondents to observe whether their admitted use of condoms could be predicted using an IAT, or whether the implicit and explicit measures of the respondents' attitudes towards condoms could differentially predict the deliberate or spontaneous behaviours of the respondents, in relation to condom use. The researchers found that condom use could be predicted by explicit measures, when related to a main sexual partner, though it was not predicted by implicit measures. Conversely, they found the opposite to be true for condom use when related to a casual partner (Marsh et al., 2001).

In an interesting meta-analysis study by Babchishin, Nunes and Hermann (2013), which used the IAT to measure sexual attraction to children, the results observed that the measures of the IAT were able to distinguish between sexual offenders against children (SOC), compared to individuals who were non-SOC. The IAT measures used *sex* versus *not sex* as the superior discriminations, and *erotic* versus *non-erotic* as the categorical discriminations. Using self-reports and sexual offense histories as variables, Babchishin et al. found statistically significant moderate relationships with the IAT, with the largest test differences being observed between the SOC participants, compared to non-offenders.

### **2.10.3 Psychometric properties of the IAT**

It is worthwhile at this juncture to comment on the reliability and validity of the IAT. There exists a debate among psychologists, for example, whether the IAT “needs more solid psychometric footing before it enters the public sphere”, such as in legal settings (Azar, 2008, p. 44). In the case of the Babchishin et al. (2013) study, for example, the authors asserted that

*“Although these IAT measures can discriminate between groups and show convergence with other measures of sexual interest, a better understanding of the construct validity*

*of these tools is required before their use in the assessment, treatment, and supervision of sex offenders”.*

The major internal validity concern relating to the IAT is whether the IAT effects that are derived from the IAT are in fact simply a result of other confounding variables contrary to the aims of the test (Kaufman, 2011). Indeed, even the hidden racial prejudice of Greenwald et al.'s (1998) landmark study have been questioned. For example, internal validity concerns have been raised regarding the familiarity of the names used in the Greenwald et al. (1998) study, such as whether fast responses actually revealed any racial attitudes, or whether they were a matter of other confounding variables. Authors such as Kaufman (2011) have argued:

*It's well known that people are prejudiced against the "out-group". Perhaps the IAT-effect is just a result of the human capacity to associate positive stimuli more easily with their in-group, and negative stimuli more easily with their out-group. In other words, perhaps the IAT is tapping into a more general quirk of human nature rather than a specific race effect.*

Dasgupta, Greenwald and Banaji (2003) in response to the questions of validity of the IAT conducted a novel study to ‘prove’ the reliability and validity of the IAT. In their study, the authors administered an IAT where pictures of unfamiliar black and white people replaced the ‘familiar’ first names that had previously been used in the Greenwald et al. (1998) study. The results still showed a preference for white people relative to black people, implying that the IAT does not necessarily measure familiarity but rather measures implicit attitudes (Dasgupta et al., 2003).

Nosek and Smyth (2007) tested the construct validity of the IAT in their study, by applying the classic multitrait-multimethod design devised by Campbell and Fiske's (1959). As is

common parlance in research Psychology, construct validity is “one of the most important concepts in all of psychology”, as it measures the extent to which a test measures what it purports to be measuring (Westen& Rosenthal, 2003, p. 608). After running multitrait-multimethod convergent analysis on the IAT Nosek and Smyth (2007, p. 26) concluded:

*Convergent evidence across a variety of research programs suggests that the IAT is a valid measure of attitudes. Like other methods such as semantic differentials, Likert scales, sequential priming, and the Stroop task, the IAT can be adapted to measure evaluations of many types of social categories. The cumulative evidence identifies design factors that will influence the method’s validity, and provides a nomological net of knowledge to accelerate validation of novel applications of the IAT.*

The above discourses on the IAT suggest that the IAT is a good instrument for measuring constructs such as attitudes; and it is arguably very reliable (Dasgupta et al., 2003). My study will thus employ the IAT to further analyse student attitudes towards sexual concurrency in a sample of University students; the achievement of this application will thus add a new perspective to the analysis of sexual concurrency and sexual research.

## **2.11 CONCLUSION**

This concludes the literature review chapter. There are more people infected with HIV in South Africa than there are in any other country in the world, making HIV/AIDS, and its underlying implicit cognitive elements of significant importance. A significant factor for the spread of HIV has been attributed to sexual concurrency, where the prevalence in South Africa, despite generally negative perceptions on the practice, is high. Ultimately, however, the cognitive processes describing sexuality and sexual practice are complex. The IAT, developed in 1998, has been tested in numerous settings, and has proven to be a good

instrument for measuring implicit cognitive constructs such as attitudes that measure sexual attitudes. In line with other explicit measures, the IAT was therefore chosen as the primary triangulation instrument for observing implicit cognition in my study. The dissertation continues, next, with the methodology employed to achieve my research objective and aims for my study.

From the above literature review; my research hypothesis are:

1. Hypothesis 1: Students will reveal high levels of sexual concurrency, both in implicit and explicit measures;
2. Hypothesis 2: There will be a positive correlation between reported implicit and explicit attitudes towards sexual concurrency; and
3. Hypothesis 3: Age and gender will be the strongest predictors for sexual concurrency as measured by the IAT.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.1 RESEARCH DESIGN AND SETTING**

A quantitative research method was used to achieve the aims of this research study. The quantitative research method is defined as a process that involves the systematic analysis of numerical data to derive generalised findings from the sample under study to the population at large (Bless, Higson-Smith & Kagee, 2006). Ary, Jacobs, Razavieh and Sorensen (2006) further state that the quantitative approach involves generalising findings, to predict behaviour and to provide causal explanations regarding a phenomenon under study.

The quantitative method was chosen based on the foundation that this would provide a synthesised numerical analysis of survey analysis as well as IAT analysis to determine whether differences exist in a student population between explicit (conscious attitudes) and implicit (unconscious attitudes) attitudes towards sexual concurrency.

#### **3.2 SAMPLING METHOD**

Purposive sampling was used to recruit participants for this study. Purposive sampling is defined as the “act, process or technique of selecting a suitable sample...or a representative part of a population for the purpose of determining parameters or characteristics of the whole population” (Rakotsoane & Rakotsoane, 2006, p. 26). Students were specifically chosen as the unit of analysis so as to provide information about issues of central importance to the purpose of concurrency research as they form a category of individuals most affected by STI and HIV (Bogart et al., 2011; United Nations, 2012).

### **3.2.1 Participants**

Purposive sampling was used to recruit seventy students registered at Rhodes University in 2014. Participants included undergraduate males (n=30) and female (n=40) students between the ages of 18 and 25. Participants were recruited at different locations within the Rhodes University campus including the Rhodes University residential system and through places of learning, such as the Rhodes University library to participate in the research. All participants were compensated with R20 for partaking in the research study.

### **3.2.2 Exclusion and inclusion criteria**

Participants were included or excluded in the study based on their age, all participants had to be between the ages of 18 and 25 years because the study was particularly targeted at this demographic group. The choice of this demographic sample was based on the literature that has reported that this age group is most at risk of HIV infection, partakes in risky sexual behaviours, and is likely to practice sexual concurrency (Shisana et al., 2005). To ensure that participants were within the specified age population, the researcher confirmed the ages of the participants when participants arrived at the study site. The participants also needed to have a basic level of computer skills so as to be able to input responses into the IAT test.

## **3.3 MATERIALS**

### **3.3.1 Explicit questionnaire**

A demographic questionnaire was administered to obtain information about the participants' race, gender, age and sexual orientation (please see Appendix A). An explicit questionnaire: *The Sexual Relationship Questionnaire* (Appendix B) was used to obtain information about the participants' sexual history and attitudes towards sexual behaviour and sexual

concurrency. This questionnaire was based on specific questions related to sexuality and sexual concurrency derived from the South African National Communication Survey (Measure DHS, 2009). The above questionnaires sought to understand self-reported (explicit) attitudes towards sexual concurrency.

### **3.4 IMPLICIT ASSOCIATION TEST**

The instrument for measuring implicit cognition relating to sexual concurrency for this study was the Implicit Association Test (IAT), as devised by Greenwald et al (1998). The IAT was previously discussed in the literature review chapter (Please see Section 2.10).

#### **3.4.1 Execution of the IAT**

Like most IATs, the protocol in this study was designed following the guidelines suggested by Greenwald et al. (1998). Two aspects of consideration in the execution of IATs relates to the theory around the number of trials used, and the use of pictures. A trial is defined as the time from the onset of a single stimulus to the correct categorisation of that stimulus. As noted by Ginner-Sorrolla, Garcia and Bargh (1999), positive and negative assessments of objects possess many features that are characteristic of automatic processes, and while attitudes may be formed or changed without a person's awareness, these attitudes can be activated “very efficiently, with a minimum of processing time and effort” (p. 77). For example, images, facial expressions or words can be used to evoke positive or negative reactions in people; even from presentation intervals that are very brief (Ginner-Sorrolla et al., 1999). Pictures and words were therefore used as the stimuli in this study’s IAT.

The number of trials also warrants careful consideration. The number of trials should be sufficient to render suitable statistical significance, but not so large as to generate “attitude







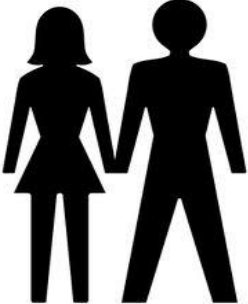



conditioning” (Greenwald & Banaji, 1995). Thus, Greenwald et al. (1998) recommend the use of less than 50 trials, as well as the reversal of the stimuli, to prevent attitude conditioning.

For my IAT, the first set of IAT materials consisted of four words used to capture positive connotations of stimuli (*beautiful, fabulous, amazing, charming*) and four words to capture negative connotations of stimuli (*awful, horrible, disgust, nasty*). The concept nouns were selected from a list provided by Greenwald et al. (2002). The second set of IAT stimuli consisted of pictures (see Table 3-1) that were specifically designed to represent the concepts of sexual monogamy or sexual concurrency to the respondents. The monogamous pictures showed an individual with one partner, while the multiple partners’ pictures showed an individual who was in a relationship with multiple persons at the same time. All picture images were captured from the Internet<sup>1</sup>.

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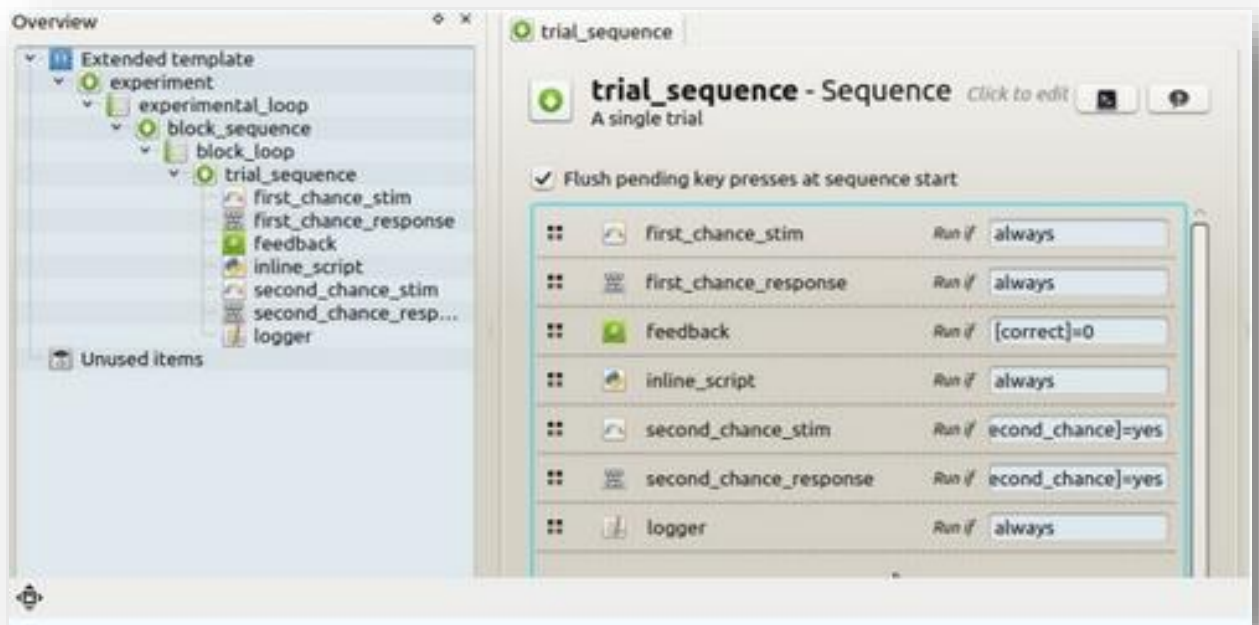
<sup>1</sup>Note: All pictures were taken from the internet and were carefully chosen by researchers who have previously published on the topic of sexual concurrency (e.g. Kenyon & Zondo, 2011)

**Table 3-1 Pictures of sexual monogamy and concurrency used for the IAT**

Sexual Monogamy	Sexual Concurrency
	
	
	
	
	

### 3.4.2 Apparatus

The experiment was administered on a modern IBM-compatible, Windows 8 operated laptop computer. The keyboard inputs, pictures, connotation words and the IAT for this study were compiled and executed using the Open-Sesame software programme (Matchot, Schreij, Theeuwes, 2012). Open- Sesame is a free open source plug-in created for a range of cognitive psychology experiments. As shown in Figure 4, the participants viewed the display from a distance of approximately 65 cm. The input for the IAT included the left key “z” and right key “m” on the computer keyboard, and participants gave left responses with the left forefinger (using the “z” key) and right responses with the right forefinger (using the “m” key). These were utilised to capture the respondents’ inputs to either the positive words, negative words, monogamous pictures, or multiple-relationship pictures. This was done in order to observe the speed of association between the sexual concurrency pictures and the positive words, or sexual monogamy pictures and the negative words; or vice versa.



**Figure 4** Screen shot of the Open-Sesame programme

Throughout the study, Open-Sesame presented the stimuli and recorded the latencies, or delays between each keyboard press. The stimuli were presented on the centre of the screen, and the data was sent back to a web server after completion of each test for reaction-of-time analysis.

### 3.4.3 IAT Design and protocol

As per the IAT design by Greenwald and Banaji (1995), and Greenwald et al. (1998), the IAT measures obtained for each participant were analysed in a design comprising five procedural variables, as shown in Table 3-2 and described in more detail in the Procedure section.

Blocks B1, B2, and B4, were practice trials, and the sorting rules in blocks B1, B3, B5 were counterbalanced between the subjects. The critical blocks of analysis were blocks B3 and B5, as shown in Table 3-2.

**Table 3-2 Sequence of blocks for the IAT used in this study**

<b>Block number</b>	<b>Block description</b>	<b>Type of block</b>	<b>‘z’ key category</b>	<b>‘m’ key category</b>	<b>Number of trials</b>
1	Single categorisation of target word	Practice	Positive	Negative	16
2	Combined categorisation	Practice	Positive and Monogamy	Negative and multiple Partners	32
3	Combined categorisation	Test	Positive and Monogamy	Negative and multiple Partners	48
4	Combined categorisation reversed	Practice reversed	Positive and Multiple Partners	Negative and Monogamy	32
5	Combined categorisation reversed	Test, reversed	Positive and Multiple Partners	Negative and Monogamy	48

As shown in Table 3-2, Block 1 of the IAT stimuli consisted of only the words that captured either positive or negative connotations, and formed the first round of practice trials. Block 2 of the IAT stimuli consisted of pictures representing multiple or monogamous relationships, and either positive or negative connotation words. Block 3 consisted of a combination of words and pictures, with positive connotation words and monogamous pictures placed in one setting and negative connotation words and multiple partners’ pictures under the same side of the screen. Block 4 consisted of a reversed set of stimuli where positive connotation words were placed with multiple partners’ pictures and the negative connotation words were placed under the same setting with the monogamous pictures. Block 5 was the second block of the reversed entities.

### 3.4.4 Procedure

All participants in this research were tested independently either in the Department of Psychology or at a secure and quiet room at the Rhodes University library. The participants were fully informed about the purpose of the study and their role in the study. A specific work station was set up in the library for the purpose of this study, equipped with the researcher's laptop, a desk and a chair each for the participant and researcher. For participants recruited from the student residences, the researcher set up a work station using the same equipment in a quiet room in the residences to ensure that there were no interruptions.

All participants were briefed about the study and the IAT test so that any questions the participants may have had prior to the test could be addressed. After being seated at the computer, the participants received all the instructions for the test from the computer display and all of their responses were entered via the laptop computer's keyboard.

The IAT was administered first. All tasks were administered in trial blocks consisting of either 16, 32 or 48 independent association trials, as shown previously in Table 3-2. Each trial block began with instructions on the computer monitor describing the category discriminations for the block and the assignments of the left ("z") and right ("m") response keys to the categories. Reminder labels were displayed in appropriate the left or right of the screen, and remained in sight throughout each block.

Each new discrimination category, as described in the design consisted of a practice block of 32 trials followed by a test block of 48 trials for which data were analysed. The first trial began 400ms after the explanation screen had been displayed and upon selection of the 'Proceed' button. Stimuli were shown in black font or as pictures against a grey screen background, centred vertically and horizontally in the display. The stimuli remained on the

screen until the participant had responded. The key press by the participant initiated a delay, or inter-trial interval, before the next trial's stimulus was shown. The inter-trial interval for all blocks was 100ms. Trials in which an error was made required the participant to correct the error before proceeding. Throughout the experiment, after any incorrect responses, a red cross was displayed on the screen until the respondent entered the correct response key. Words and pictures were displayed randomly, and each picture and/or word was used a proportionally equal number of times.

The specific procedures for each trial block of the IAT were as follows:

In Block 1, words were to be categorised as either positive or negative words. Open-Sesame displayed words on the centre of the screen and the task of the participants was to categorise the positive words in a *left* category by pressing the “z” key on the keyboard, and the negative words in a *right* category by pressing the “m” key on the keyboard. There were 16 trials in this task and this was a practice trial.

In Block 2, participants had to complete a second task, which formed a practice block of 32 trials. The block required participants to make an association between either the monogamous pictures *or* the positive words in a *left* category by pressing the “z” key on the keyboard; and either the multiple partners’ pictures *or* the negative words in a *right* category by pressing the “m” key on the keyboard. The pictures and words were those described previously (e.g. see Table 3-1).

Block 3 was the first of the test blocks, and included a repeat of the practice in Block 2. The difference was that it consisted instead of 48 trials, and the data gathered from this block was used as one of the outcome measures of the IAT.

In Block 4, the participants received a different categorisation whereby the categories of monogamous and multiple partners' pictures were reversed. For example, the left key "z" was now associated with positive words or pictures that expressed multiple partners, and the right key "m" was used to categorise negative words along with pictures that displayed monogamous relationships. Participants had to carry out 32 trials in this practice block.

Block 5 was a reversed test, as in Block 4, however it consisted of 48 trials, and the data gathered from this block was used to establish the outcome of the IAT. Participants used the "z" key to categorise positive words or pictures that displayed multiple partners, and the "m" key to categorise negative words and pictures that displayed monogamous relationships.

Upon completion of the IAT test, the participants completed the explicit questionnaire. Thus, after the computer tasks, the participants completed explicit, paper-and-pencil questionnaire measures of their attitudes toward sexual concurrency and sexual monogamy, based on specific questions related to sexuality and sexual concurrency derived from the *South African National Communication Survey* (Measure DHS, 2009).

The IAT and explicit measures took between 15 and 20 minutes to complete.

### **3.5 STATISTICAL ANALYSIS**

The IAT used for this project comprised of five blocks of tasks that needed to be completed in order to calculate a *D*-score. The *D*-score in the IAT refers to the average response rate that an individual takes to complete the trial block, and this performance difference is measured using the test blocks of the IAT (Greenwald et al, 1998).

IAT data analysis was calculated using the scoring algorithm recommended by Greenwald et al., (1998). As such, this analysis required computing the difference score between the mean

response times derived on Block 3 and Block 5. Considerations for calculating the *D-score*, as recommended by Greenwald, Nosek and Banaji (2003) are shown in Table 3-3.

**Table 3-3 Summary of the IAT scoring procedure for this study**

- 
1. Delete trials greater than 10, 000 milliseconds
  2. Delete subjects for whom more than 10% of trials have latency less than 300 milliseconds
  3. Compute the inclusive standard deviation for all trials in Stages 2 and 4 and likewise for trials in Stages 3 and 5
  4. Compute the mean latency for responses for each of Stages 2, 3, 4, and 5
  5. Compute the two mean differences:  
(Mean Stage 2 and Mean Stage 4) and (Mean Stage 3 and Stage 5)
  6. Divide each difference score by the associated inclusive standard deviation
  7. *D*=the equal-weight average of the two resulting ratios
- 

*Note.* This computation is appropriate for designs in which subjects must correctly classify each item before the next stimulus appears. Greenwald et al (2003).Source: Greenwald et al (2003)

### **3.6 CORRELATION BETWEEN IMPLICIT AND EXPLICIT DATA**

Further statistical analysis included calculating the alpha coefficient for all dichotomous, ordinal, or interval variables from the explicit questionnaire and IAT were calculated. ANOVA was performed to carry out all D-scores, using various internal variables from the questionnaires. The correlation analysis was also performed (Pearson's correlation coefficient, *r*, as well as Kendall's tau for the sake of the nominal and ordinal categorical variables from the questionnaire). Key analysis was in evaluating whether there was a positive correlation between items on the questionnaire related to explicit attitudes towards sexual concurrency and whether these explicit attitudes correlated to the D-scores on the IAT. Additionally, a linear regression of the pertinent internal variables or predictor variables was performed to predict the D-score outcome, with corresponding effect sizes.

### **3.7 ETHICAL CONSIDERATIONS**

There were no unforeseen ethical violations anticipated to the participants in the proposed research. Nonetheless, due to the nature of the study it was noted that participation could possibly give participants insight or awareness, thus likely to reflect on their own risk taking sexual behaviours. Therefore, they were advised to consult the Rhodes Psychology Clinic (046 603 8502) or the Counselling Centre (046) 603 7070) should they experience any distress as a result. Ethical consideration were sought from a number of entities and these included a) Informed consent from the research participants (Appendix D); b) Ethical clearance from the Rhodes University Research Ethics Committee (Appendix E2). To ensure privacy was maintained subject codes were used to keep participants anonymous.

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<sup>2</sup>Rhodes University project are cleared departmentally within the Department of Psychology and full theses are further reviewed by the Rhodes University Ethics Committee. My thesis was a half thesis and was thus cleared internally. Attached in Appendix E is the final clearance from the Department of Psychology's Ethics Committee Body.

## **CHAPTER FOUR:**

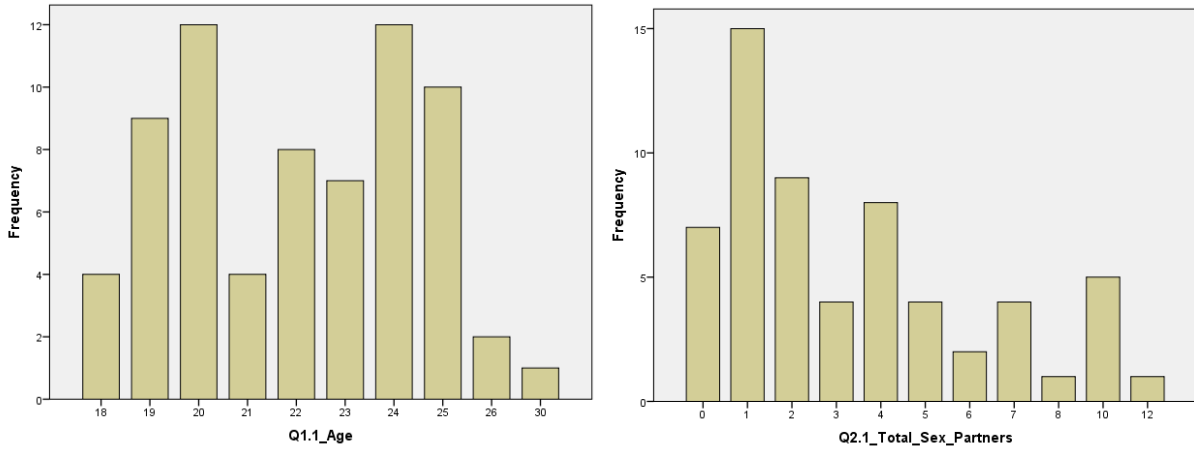
### **RESULTS**

#### **4.1 INTRODUCTION**

This chapter presents the results of this study. It begins with presenting (a) the demographic characteristics of the participants in the study; the (b) inferential statistics relevant to Hypothesis 1 are presented; followed by (c) the correlational analysis relevant to Hypothesis 2. Lastly, (d) linear regression analyses relevant to Hypothesis 3 are presented.

#### **4.2 DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS**

The study comprised of 70 participants. Males comprised 42.9 % (n=30) of participants, whilst females comprised 57.1% (n=40) of the study. Participants in the study were distributed across racial groups with 70.0% African (Black; n=49), 14.3% White (n=10), 2.9% Indian (n=2), and 12.9% 'other' (n=9). The majority of respondents (74.3%, n=52) referred to themselves as being in heterosexual relationships, while 5.7% (n=4), described themselves as women who have sex with women (lesbian), 17.1 (n=12) as men who have sex with men (gay), and 2.9% (n=2) as 'other' (bisexual). Figure 5 shows respondents' distribution by age, ranging from 18 to 30 years of age. The average age of the group was 22.09 years of age, with a standard deviation of 2.54 years.



**Figure 5 Distribution of respondents by age (left), and by total number of sexual partners (right)**

The tables of the distribution of the respondents by age and by total number of sexual partners are shown the following tables, respectively.

**Table 4-1 Distribution of respondents by age**

Age		Frequency	Percent
Valid	18	4	5.7
	19	9	12.9
	20	12	17.1
	21	4	5.7
	22	8	11.4
	23	7	10.0
	24	12	17.1
	25	10	14.3
	26	2	2.9
	30	1	1.4
	Total	69	98.6
Missing	System	1	1.4

**Table 4-2 Distribution of the respondents by total number of sexual partners**

<b>Total number of sexual partners</b>		<b>Frequency</b>	<b>Percent</b>
Valid	0	7	10.0
	1	15	21.4
	2	9	12.9
	3	4	5.7
	4	8	11.4
	5	4	5.7
	6	2	2.9
	7	4	5.7
	8	1	1.4
	10	5	7.1
	12	1	1.4
	Total	60	85.7
Missing	System	10	14.3

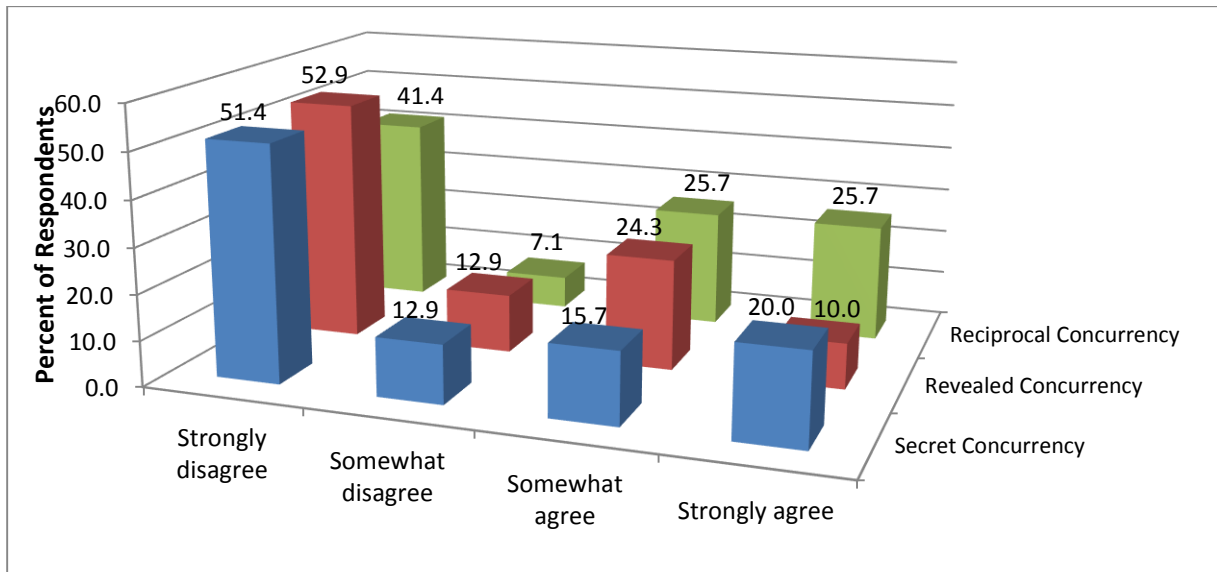
### **4.3 TESTING HYPOTHESIS ONE**

This hypothesis stated that students would reveal high levels of sexual concurrency both in implicit and explicit measures. To test this hypothesis, results relating to the IAT were observed, and compared to the results of the explicit questionnaire. This hypothesis was partially confirmed.

### 4.3.1 Preliminary descriptive statistics relating to this hypothesis

The total number of sexual partners varied among the respondents, between zero and twelve partners, whereby all but seven of the respondents had had at least one sexual partner, and the mean total number of sexual partners was 3.45 (Figure 1). In terms of current sexual concurrency, when asked '*How many sexual partners do you **currently** have*', nearly one third (33.2%, n = 23) of the participants responded to only having one sexual partner, nearly 40 percent (38.7%, n=23) had two or more sexual partners, and the remaining 29% (n=18) had no current sexual partners. The proportion of individuals who admitted to having previously had concurrent sexual partners was significantly higher than those currently in multiple relationships, at 61.5% of the respondents who provided a response for this question. When the responses to the current number of sexual partners and previous concurrency were combined to generate a tendency for monogamy versus concurrency, 59.70% of the total number of respondents had had some degree of sexual concurrency, and only around 40% had maintained sexual monogamy, or had never had a sexual partner. Somewhat congruently to this statistic, almost half of the respondents (50.8%) suggested that their sexual partners were also in a concurrent relationship.

Regarding participants' opinions of sexual concurrency, a key question asked from the NSC asked: "*Is it okay to have sex with others as long as your main partner did not find out about it?*" (**secret concurrency**). Half of the respondents (n=36) strongly disagreed that it was okay while only 20% strongly agreed (n=14), and 28.6% (n=20) either somewhat agreed or somewhat disagreed with this assertion, as shown in Figure 6.



**Figure 6 Frequency distribution of respondent opinions of concurrency**

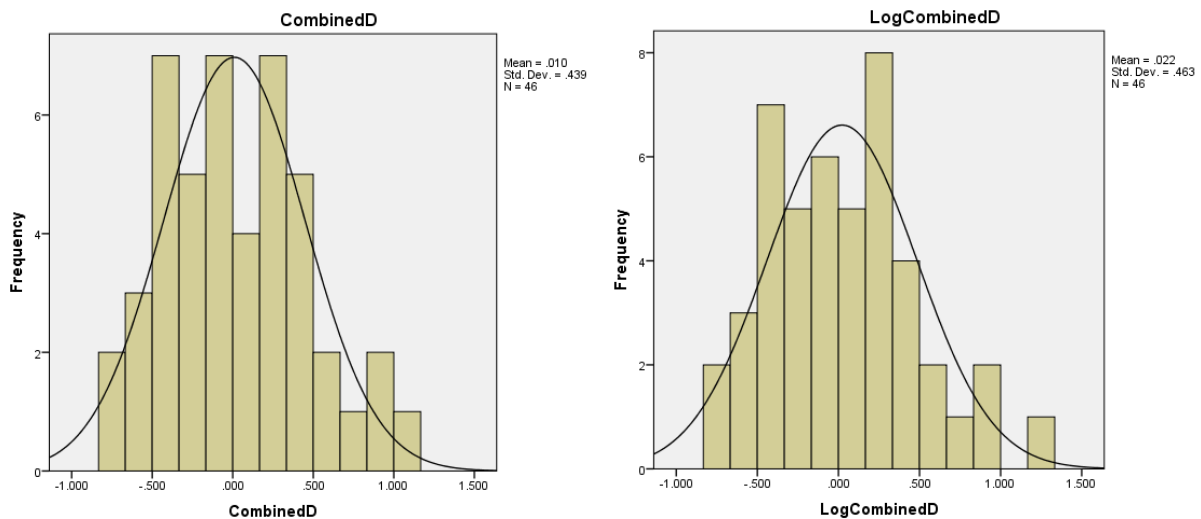
When asked “*Is it okay to have sex with others as long as you were honest with your main partner?*” (**revealed concurrency**), the proportions of responses that strongly or somewhat disagreed remained approximately the same as the question on secret concurrency, at 52.9% (n=37) and 12.9% (n=9) respectively. However, the number who strongly agreed to revealed concurrency reduced by half compared to those who strongly agreed to secret concurrency, down to 10% (n=7), and the proportion who somewhat agreed to revealed concurrency, increased to 24.3% (n=17).

When asked “*Is it okay to have sex with others if your main partner had other sexual partners?*” (**reciprocal concurrency**), over half of the respondents somewhat or strongly agreed (25.7% each), while only around 40% strongly disagreed; and 7.1% somewhat disagreed.

From the above, with regard to students’ responses to the explicit questionnaire, we can draw the conclusion that concurrency appears to be most accepted in the case where a partner was observed to be in a concurrent relationship (reciprocal concurrency), and least accepted in the case where the concurrency was open and revealed (revealed concurrency).

### 4.3.2 Results of the Implicit Association Test

IAT D-scores were generated for each study participant, as per the guidelines suggested by Greenwald et al. (2003). D-scores were calculated between test blocks three and five, and blocks two and four, taking the pro-multiple sexual concurrency (block five and block four) from the pro-monogamous (block three and block two) blocks respectively. The frequency of D-scores for respondents, combining the block three and five, and block two and four D-scores is shown in Figure 7(left), and the log-transformed<sup>3</sup> latencies that were calculated to compare their D-scores to the standard combined D-scores are shown in Figure 7 (right).



**Figure 7 Frequency of D-scores for respondents, combining the Block 3 and 5, and Block 2 and 4 D-scores (left) and log transforming these D-scores (right)**

Mean D-scores that are positive indicate a preference for multiple relationships over monogamous, since the time to associate positive words with multiple relationship pictures would have been shorter than the time to associate positive words with monogamous relationship pictures. Similarly, mean D-scores that are negative indicate a preference for monogamous relationships over multiple relationships, since the time to associate positive

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<sup>3</sup> log-transformed latencies are often calculated in order to provide a D-score with a statistically satisfactory stability of variance for different (Greenwald et al., 1998).

words with monogamous relationship pictures would have been shorter than the time to associate positive words with concurrent relationship pictures (Barnes-Holmes, Murtagh, Barnes-Holmes & Stewart 2010).

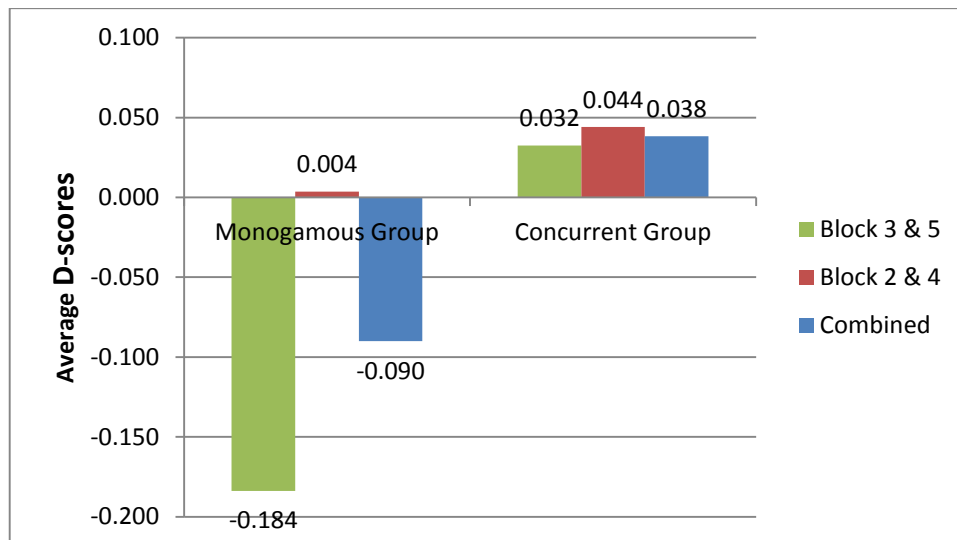
As shown in **Error! Reference source not found.**, the practice blocks (Block two and Block four) mean D-score for all participants was 0.065, while the test blocks (three and five) mean D-score was -0.046. Thus, the average combined D-score of all suitable latencies in blocks three and five, combined with blocks two and four was positive, at 0.0098, indicating that on average, the group of respondents showed a very slight preference for multiple relationships over monogamous.

**Table 4-3 Mean D-scores for the respondents**

	<b>Block 3 &amp; 5</b>	<b>Block 2 &amp; 4</b>	<b>Combined</b>	<b>Log transformed</b>
	<b>D-Score</b>	<b>D-Score</b>	<b>D-Score</b>	<b>D-Score</b>
<b>N Valid</b>	46	46	46	46
<b>Missing</b>	24	24	24	24
<b>Mean</b>	-0.04550	0.06515	0.00983	0.02192

As per the requirements of the IAT methodology, respondents with more than 10% of response latencies shorter than 300ms were discarded from the data set; and as shown in Table 4-3, a significant number — more than a third of respondents (34%, n=24) — had over 10% of their response latencies being under 300ms.

When the D-scores of the respondents were grouped based on their past and current sexual practices, an interesting differentiation could be observed. Respondents who had either previously, or currently had more than one sexual partner (the concurrent group) showed positive average D-scores for their block three and five, block two and four, and combined D-scores, with values of 0.032, 0.044 and 0.038 respectively. The group of respondents who had never practiced sexual concurrency before presented negative average D-scores of -0.184, 0.004 and -0.090 for their block three and five, block two and four, and combined D-scores respectively, as shown in Figure 8. From the above, we can summarise that respondents who had either previously, or currently had more than one sexual partner showed a preference for multiple relationships over monogamous, since their average time to associate positive words with multiple relationship pictures was shorter than their times to associate positive words with monogamous relationship pictures. Similarly, the group of respondents who had never practiced sexual concurrency before showed a preference for monogamous relationships over multiple relationships, since their average time to associate positive words with monogamous relationship pictures was less than their time to associate positive words with concurrent relationship pictures.



**Figure 8 Grouped D-scores for the respondents, based on their past and current sexual practices**

It should be noted, though, that while the averages of the respondents were negative for the monogamous group (showing a bias for monogamous over multiple relationships), and positive for the concurrent group (showing a bias for multiple over monogamous relationships), individual respondents from each sexual tendency group answered across a spectrum of positive and negative D-scores, as shown in Appendix C.

Interestingly, a one-way between-groups analysis of variance (ANOVA) on the block three and five reported ( $F(1, 42) = 3.284, p = 0.077$ ) indicating that there was quite a variation between the D-scores of the individuals between their Block 3 trials, compared to their Block 5 trials. This was not statistically significant more than 90% confidence, but not more than 95% confidence.

Further analysis on Block 2 and 4 reported ( $F(1, 42) = 0.056, p = 0.814$ ) indicating that there was no variation between the D-scores of the individuals between their Block 2 trials, compared to their Block 4 trials at any statistical significance.

Lastly, the combined D-scores reported  $F(1, 42) = 1.071, p = 0.307$  indicating that the variation between the combined D-scores of the individuals was not consistent with any statistical significance. Upon performing two separate one-sample  $t$  tests analyses, it was evident that neither the IAT effect for the monogamous respondents, nor the concurrent respondents differed significantly from zero,  $t(20) = -0.968, p = 0.345$ ; and  $t(22) = 0.463, p = 0.648$  respectively. The above analysis again indicates that the variation between the combined D-scores of the individuals was not consistent with any statistical significance. It is however insightful to note that the D 500 scores, although not significant indicate a slight correlation with explicit responses on attitudes towards sexual concurrency.

The tests for reliability (Cronbach's Alpha), and the correlation analyses are shown in Appendix 2.3.

#### **4.4 TESTING HYPOTHESIS TWO**

This hypothesis stated that there would be a positive correlation between the reported implicit and explicit attitudes of the respondents towards sexual concurrency. This hypothesis was again partially confirmed. As noted in studies by Czopp et al. (2004) and Marsh et al. (2001), relating to implicit and explicit attitudes relating to condom use, these studies found evidence that the implicit and explicit attitudes of their respondents were correlated, suggesting that the implicit and explicit attitudes of sexually-related research topics may be related. This hypothesis was therefore tested in this study as well.

In the case of the ordinal variables, *Kendall's correlation coefficient tau* ( $\tau$ ) was observed instead of Pearson's product moment correlation coefficient (PMCC). This analysis included correlation analysis of the three sexual concurrency variables from the *Explicit Questionnaire*

describing the respondents' opinions on sexual concurrency and implicit attitudes towards sexual concurrency. The key *Explicit Questionnaire* variables were:

- *secret sexual concurrency*<sup>4</sup>— they believed it was okay to have sex with others as long as their main partner did not find out about it;
- *revealed concurrency*<sup>5</sup> — they believed it was okay to have sex with others as long as they were honest with their main partners; and
- *reciprocal concurrency*<sup>6</sup> — they thought it was okay to have sex with others if their main partner had other sexual partners.

Correlations that were statistically significant are marked yellow in

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<sup>4</sup> Is it okay to have sex with others as long as your main partner did not find out about it?

<sup>5</sup> Is it okay to have sex with others as long as you were honest with your main partner?

<sup>6</sup> Is it okay to have sex with others if your main partner had other sexual partners?

Table **4-4**, with  $p < 0.05$  also marked with ‘\*’, and values of  $p < 0.01$  additionally marked with ‘\*\*’. As shown in

Table 4-4, a moderate – to – strong positive correlation was observed between people’s preference for revealing sexual concurrency and people’s preference for reciprocal sexual concurrency ( $\tau = 0.710$ ,  $p = 0.000$ ). Described alternatively, people who answered high rank scores for the questionnaire enquiry on revealing sexual concurrency also tended to answer high rank scores for the enquiry on performing reciprocal sexual concurrency, and similarly for individuals who answered low rank scores for each respective question.

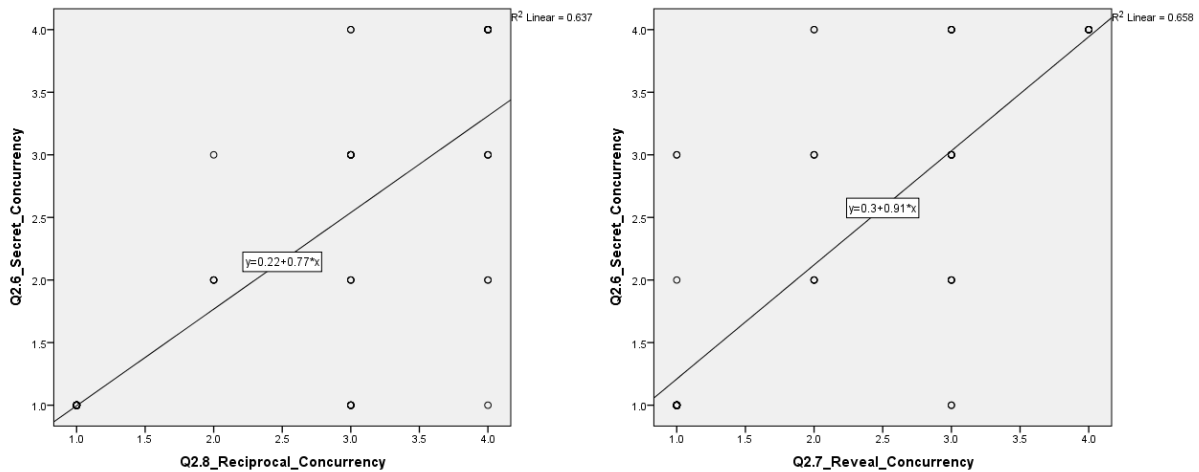
**Table 4-4 Kendall's tau co-efficient for correlation of ordinal and nominal variables**

		Secret Concurrency	Reveal Concurrency	Reciprocal Concurrency	Block 3&5D- score
Total Sex Partners	Correlation Coefficient	0.501**	0.451**	0.517**	0.131
	Sig. (2-tailed)	0.000	0.000	0.000	0.270
Current Sex Partners	Correlation Coefficient	0.392**	0.418**	0.346**	0.044
	Sig. (2-tailed)	0.000	0.000	0.001	0.721
Secret Concurrency	Correlation Coefficient	1.000	0.776**	0.759**	0.237*
	Sig. (2-tailed)		0.000	0.000	0.040
Reveal Concurrency	Correlation Coefficient	0.776**	1.000	0.710**	0.257*
	Sig. (2-tailed)	0.000		0.000	0.027

A slightly higher moderate – to – strong positive correlation was observed between people's preferences for secret sexual concurrency and their preferences for performing reciprocal sexual concurrency ( $\tau = 0.759$ ,  $p = 0.000$ ). An even higher moderate – to – strong positive correlation was observed between people who answered high or low rank scores for the question on secret sexual concurrency and people who answered high or low rank scores for the question on revealing sexual concurrency ( $\tau = 0.776$ ,  $p = 0.000$ ). Other weaker, but still statistically significant correlations are shown in

Table **4-4**.

Scatter plots of the positive correlations between respondent answers on secret sexual concurrency and performing reciprocal sexual concurrency (left), and the question on secret sexual concurrency and revealing sexual concurrency (right) are shown in Figure 9



**Figure 9** Scatter plots of secret and reciprocal sexual concurrency (left), and secret and revealed sexual concurrency (right)

#### 4.5 TESTING HYPOTHESIS THREE

This hypothesis stated that age and gender would be strong predictors for sexual concurrency. Linear regression was performed using the combined D-score as the dependent variable (DV) and each questionnaire variable calculated individually as the independent variables (IV). Results of these tests are shown in Table 4-5. The standard error of the estimate is a measure of the accuracy of the predictions, and as shown in the table, the standard errors were all suitably small, indicating that the predictions were all considerably accurate. The necessary assumptions for linear regression were also met, whereby homoscedasticity (homogeneity of variance) was shown in each case; the variance of the residuals in the analyses were not constant across the predictor variable, since in each case, the mean residual was approximately 0.00. Linearity was also confirmed; and the independence of observations were

established, based on the Durbin-Watson statistic being close to 2.000 in nearly all cases, except the relation of *total sexual partners* to the DV as shown in Table 4-5.

#### **4.5.1 Testing the Hypothesis using Effect size calculations and significance levels**

The R-squared value of the regression was calculated to determine the effect of each of the IVs on the IAT D-score. With regard to age, whereby *age* was modelled as a predictor against the combined D-scores, an R-squared value of 0.062 was observed, indicating that 6.2% of the variability in the Combined D-scores of the respondents could be accounted for by the respondents' ages. This was corrected to 4.0% due to the total usable sample size being considerably less than 100 participants. This was at a significance less than 10%, but not at a 5% significance, as shown by the ANOVA result  $F(1, 43) = 2.848; p = 0.099$ . **Gender** was not a significant predictor of sexual concurrency at either the 10% or 5% significance level  $F(1, 43) = 0.243, p = 0.624$ . Hypothesis 3 was thus not confirmed. Miscellaneous findings of interest to the regression analysis are further deliberated on Appendix F.

**Table 4-5 Results of the linear regression, with Combined D-scores as the DV, and each variable as IV**

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>	<b>Durbin-Watson</b>	<b>Anova</b>
<b>Age</b>	0.249	0.062	0.040	0.429	1.740	$F(1,43)=2.848$ ; $p=0.099$ .
<b>Gender</b>	0.075	0.006	-0.017	0.443	1.665	$F(1,43) = 0.243$ ; $p = 0.624$ .
<b>Race</b>	0.145	0.021	-0.001	0.438	1.737	$F(1,44) = 0.940$ ; $p = 0.337$ .
<b>Sexuality</b>	0.038	0.001	-0.021	0.443	1.641	$F(1,44) = 0.063$ ; $p = 0.803$ .
<b>Total Sex Partners</b>	0.135	0.018	-0.008	0.424	1.375	$F(1,37) = 0.683$ ; $p = 0.414$ .
<b>Current Sex Partners</b>	0.153	0.023	-0.002	0.393	1.842	$F(1,38) = 0.911$ ; $p = 0.346$ .
<b>Steady Partner</b>	0.149	0.022	-0.001	0.440	1.633	$F(1,43) = 0.974$ ; $p = 0.329$ .
<b>Previous Concurrency</b>	0.189	0.036	0.012	0.415	1.824	$F(1,40) = 1.477$ ; $p = 0.231$ .
<b>Monogamous or Concurrent</b>	0.158	0.025	0.002	0.410	1.799	$F(1,42) = 1.071$ ; $p = 0.307$ .
<b>Partner Concurrency</b>	0.080	0.006	-0.017	0.438	1.546	$F(1,42) = 0.273$ ; $p = 0.604$ .
<b>Secret Concurrency</b>	0.179	0.032	0.010	0.436	1.804	$F(1,44) = 1.451$ ; $p = 0.235$ .
<b>Revealed Concurrency</b>	0.227	0.051	0.030	0.432	1.776	$F(1,44) = 2.383$ ; $p = 0.130$ .
<b>Reciprocal Concurrency</b>	0.111	0.012	-0.010	0.440	1.722	$F(1,44) = 0.547$ ; $p = 0.463$ .

## **CHAPTER FIVE:**

### **DISCUSSION**

HIV/AIDS and sexually transmitted diseases have had a profound effect on South Africa, and young people are the most vulnerable age group to HIV infection in South Africa (Muthivhi et al., 2011), whereby as much as 8% of females between the ages of 15 and 19, and 27% of females between the ages of 20 and 24 have been measured to be HIV positive (Bogart et al. (2011). According to Kenyon and Zondo (2011) prominent studies within the South African context continue to indicate a plausible relationship between concurrently organised sexual partnerships and the trends in the spread of HIV. Indeed, the findings of studies in South Africa have shown that concurrent sexual partnerships are standard among the male students and becoming increasingly common among the female students at South Africa's universities (Psaki et al., 2013).

There were three main objectives of this study. The first was to study and identify implicit attitudes towards sexual concurrency in a South African university population using the IAT derived by Greenwald et al. (1998). The second objective was to understand if there was a positive correlation between the reported implicit and explicit attitudes towards sexual concurrency among the study participants. The third objective was to determine which variable were the greatest contributor to sexual concurrency as assessed by the IAT. In order to satisfy the above three research objectives, explicit measures from the South African National Communication Survey (Measure DHS, 2009), and implicit measures of sexual concurrency as determined by an IAT were utilised.

I will now deliberate on my findings in light of the sexuality; sexual concurrency and implicit cognition literature. I will further discuss the limitations and contributions of my research to the sexual concurrency literature.

## **5.1 DELIBERATION OF THE STUDY'S HYPOTHESES**

### **5.1.1 Hypothesis One**

In order to satisfy the arguments for, and accept the first hypothesis, the respondents in this study who engaged in concurrent relationships would have needed to show, with statistical significance, that they had underreported and/or denied the degree of their engagement with multiple partners, while having had a higher implicit bias towards sexual concurrency during the IAT.

As shown in the results of this study, in response to the question “How many current sexual partners do you have?” less than 40 percent of the respondents admitted to currently being in a sexually concurrent relationship. However, around 60 percent of all the respondents admitted to having experienced some form of sexual concurrency at some time in their past or present, when the above question was combined with the question “Were there any other times in your life when you had more than one sexual partner at the same time (yes/no)?” This finding was similar to the findings of Psaki et al. (2013), who found that concurrent sexual partnerships are standard among male students, and becoming increasingly common among female students at universities in South Africa. The result showed that just over half of the female respondents (51.3%) had practiced sexual concurrency at some time in their past or present —similar to the high findings reported by Psaki et al. (2013).

While it was expected that the total proportion of respondents who had been sexually concurrent would have been higher than just the present proportion of sexually concurrent individuals, it could be argued that individuals who may have still been sexually concurrent only claimed past concurrent activities — thereby admitting former sexual concurrency — without conceding ‘guilt’. This is because, by admitting former sexual concurrency and not

existing concurrency, respondents could have confessed to sexual concurrency, but only as a 'practice of the past'.

This would stand in favour of the hypothesis that respondents had underreported and/or denied their current degree of engagement with multiple partners. However, with 61.5 percent of the respondents who answered this question admitting to former sexual concurrency (even though this was an admission of the past), it could conversely be argued that such a high percentage would not lend itself to individuals hiding their concurrency practices. In aid of finding an answer to this disparity, a study by Westercamp, Mattson and Bailey (2013) of over ten thousand men in Kenya, revealed that 61 percent of all partnerships were concurrent, and "the lifetime prevalence of sexual concurrence" was 77 percent. Although slightly higher than the proportions in this study, and extracted from a different population, this is not wholly unlike the statistics observed here, somewhat rejecting the hypothesis that individuals had underreported their sexual concurrencies.

Another interesting result that was observed in relation to this hypothesis was the opinions that the respondents held towards sexual concurrency. While nearly 60 percent had admitted to sexually concurrent practices at some time or another, more than 60 percent of all the respondents either strongly or somewhat disagreed with the practice of secret, or even open and revealed sexual concurrency.

Thus, while nearly all of the monogamous respondents disapproved of sexual concurrency, a striking 45 percent of those who had admitted to concurrency at some time also disagreed to the practice when conducted in secret, and an even higher 53 percent disagreed to the practice if it was openly revealed. While it could have been postulated that this high proportion of concurrent individuals who disagreed to the practice were those formerly in concurrent relationships, having since changed their view on the practice and therefore explaining their

current monogamy; filtering the results further suggested a different analysis. The filter (which considered only people who had had a history of sexually concurrency) revealed that around 40 percent of the people who were presently sexually concurrent, still strongly or somewhat disagreed with the practice. These results imply a considerable relation between sexual concurrency and implicit negative attitudes, such as guilt, and these results on the relation between guilt and sexual concurrency have been well documented in the literature.

Authors such as Carey, Senn, Seward and Vanable (2010, p.42) have described how people who were sexually concurrent acknowledged “the negative consequences that could arise from concurrent sexual partnerships”. Furthermore, the aspect of guilt has been considered widely in the literature, with observations that people reported felt guilty about having sex with other people and also having a main partner (e.g. Lundberg, et al., 2011). Individuals and particularly women were also worried about the negative connotations about the stigmas of sexual concurrency, such as the negative feelings associated with being labelled as promiscuous (Lundberg, et al., 2011).

A third interesting finding from the study which may or may not have pertained to the first hypothesis, was the change in people’s opinions towards sexual concurrency when referring to the context of the concurrency. Even in the case of those who had admitted to never having had multiple partners (where all-but-one person disagreed in the event of secret concurrency), the proportion of acceptance gradually increased in the event of open and revealed sexual concurrency. As many as nine monogamous individuals either somewhat or strongly agreed to the prospect of having multiple partners in the case that they found out that their partner had had multiple relationships. Similar trends were observed in those who reported being in sexual concurrency relationships (open sexual concurrency increased with revealed sexual concurrency).

The above implies a great deal, in terms of the reasons that a person (whether monogamous or sexually concurrent) would feel guilty about sexual concurrency. Clearly, in a significant number of cases, the pressure for sexual monogamy — or guilt over sexual concurrency — is imparted by a duty to, or effect from the other sexual partner(s), and not due to a basic morality, spiritual inclination, inherent fear of STDs, or other fundamental reason for remaining monogamous. In support of this, Carey et al. (2010) found that the idea of hurting a primary partner was implicit to the guilt of practicing sexual concurrency. Thus, even in those who had to date remained monogamous, the general attitude towards concurrency, in the absence of partner pressure, or indeed the drive of revenge towards a concurrent partner, would have been positive.

Various authors have considered the reasons that people would use to practice sexual concurrency (e.g. Carey et al., 2010). In many cases, for example, Carey et al., (2010) state that individuals attempt to rationalise their sexual practices and sexual concurrency as “biologically driven, rather than a personal choice” (p. 42). Another reason that has been touted as a rationalisation for concurrency is that multiple partners meet different needs for an individual, that one partner cannot broadly fulfil (Carey et al., 2010). Another emerging thought observed by Lundberg et al. (2011) is that poor mental health, such as psychological distress and depression, appeared to contribute as a reason for women having multiple partners, where it was argued that women would resort to casual sex as a coping strategy for their psychological distress. Indeed, in this study, just over half of the female respondents (51.3%) admitted to having practiced sexual concurrency at some time in their past or present.

In contrast to the afore postulated key forces for sexual concurrency amongst women, in their study Zembe, Townsend, Thorson and Ekstro (2012, p.5) highlighted that this increasingly higher number observed among the young women may be indicative of young women

becoming aware of their various sexual needs which may not be adequately fulfilled by their main partner or in a monogamous partnership. This proposition is undeniable bringing forth in light of emerging evidence that traditionally structured partnerships in South Africa emphasising masculinity in partnerships, encouraging male partners to be domineering, controlling, and emotionally reserved. However, requiring women to be sexually reserved, compliant and understanding of their sexual partners' promiscuous behaviour. Thus proposing that the practice of sexual concurrency may be attributed to various reasons and or factors such as; love, sexual pleasure, monetary gains or rewards or coping mechanism for the abandonment from their main partner (Zembe et al., 2012).

The above results bring the topic of implicit and explicit attitudes towards sexual concurrency to the fore. As presented in the results chapter, there appeared to be an average positive score among individuals who had declared themselves to be monogamous during the questionnaire, and an average negative score among individuals who had declared some degree of current or past sexual concurrency. Based on the principles of the IAT (Greenwald et al., 1998; Greenwald et al., 2003), the IAT provides a measure of the strengths of the automatic associations that people make, based on their speed of associating opposing image concepts. Thus, individuals from the supposedly monogamous group, who were found to exhibit a positive average IAT score, associated the monogamous-type images with positive words and concurrent-type images with negative words, faster than they associated the concurrent-type images with positive words and monogamous-type images with negative words. Conversely, individuals from the concurrent group, who were found to exhibit a negative average IAT score, associated the monogamous-type images with negative words and concurrent-type images with positive words, faster than they associated the reverse.

Authors such as Barnes-Holmes et al., (2010) have found clear implicit associations between individuals who exhibit specific social practices, and the positive implicit associations that they portray towards concepts that are positively related to their social practices, and vice versa. Many other studies have also been performed substantiating the merits of the IAT as a test for implicit cognition association (e.g. Walker & Schimmack, 2008). The results could suggest that in the majority of respondents in this study, probably accurately portrayed their implicit attitudes towards the practice. In addition, as a further measure of ensuring the accuracy of the results of this study, the prescribed IAT protocols were followed precisely, and all short-responses (of which there were a considerable number) were removed from the data set. Therefore, it could be argued that the IAT results would indeed have reflected the accurate implicit attitudes of the respondents, regardless of their previous sexual history, or questionnaire submissions.

Following on from this, it should be contemplated why the ANOVA results of the IAT [ $F(1,42) = 1.071, p = 0.307$ ], and the one-sample t-test results of the IAT, relative to their monogamous and concurrency histories, did not suggest any statistical significance in the patterns of the IAT results for the monogamous and concurrent groups respectively. As noted by Saunders, Lewis and Thornhill (2009) the F-ratio represents the variance between the IAT scores of the concurrent and monogamous groups, while the p-value over 5% significance indicates that this variance is not statistically significant at a probability of less than 0.05. Stated alternatively, although the overall averages of the IAT scores for individuals showed positive and negative segregations when grouped based on their past sexual histories, apparently unsystematic variability existed for the IAT scores between individuals, regardless of whether they had noted a monogamous or a concurrent sexual preference. For example, even some monogamous individuals showed negative IAT scores, and some historically concurrent individuals showed positive IAT scores.

The explanation for this could perhaps be drawn from the aforementioned respondent opinions on sexual concurrency. Noting the number of monogamous individuals who somewhat or strongly agreed that sexual concurrency was acceptable if their partners were sexually concurrent, this would suggest that given the absence of duty towards their partner, or indeed the desire to redress their partners' concurrency, in other words, they would have had a positive implicit attitude towards sexual concurrency. It could be argued, for instance, that had they not had this implicit cognitive consent for sexual concurrency, they should have responded negatively towards sexual concurrency in the questionnaire, regardless of whether the circumstances were secret, revealed, or reciprocal.

Similarly, in the case of the individuals who had admitted to previous sexual concurrency, a spectrum of IAT scores was also observed, with the variability between their IAT responses being so varied, that no statistical significance could be rendered for their negative average group IAT score. One again, this could perhaps be explained by the 45- to- 53 percent of historically concurrent individuals who were averse to sexual concurrency, when either secret or revealed respectively.

It should be noted, however, that upon performing one-way ANOVA analyses on the IAT scores, relative to their opinions of secret, revealed or reciprocal sexual concurrency (and not based on their past sexual history), there was still no significant IAT score difference between the individuals. Thus, even if the respondents were grouped based on their explicit opinions of sexual concurrency, and not their sexual practices, considerable variation existed in the responses of the respondents, relative to their biases in the IAT test. Therefore, very little consistency existed between the respondents' biases for concurrency over monogamy in the IAT — based on their questionnaire profiles — that was statistically significant.

Thus, in conclusion to the first hypothesis, it was not conclusively found that people who engaged in concurrent relationships were likely to underreport and/or deny the degree of their engagement with multiple partners, and indeed the proportion who admitted to sexual concurrency appeared sincere. Furthermore, it could not be argued, based on the significance of the ANOVA, that they would still present a higher implicit measures score towards sexual concurrency. This is because variation existed between both the sexual practices and apparent explicit and implicit cognitive preferences of the individuals towards sexual concurrency, and their respective IAT scores.

Finally, in relation to this hypothesis, the aspect of sexual concurrency and its relation to HIV and AIDS should be deliberated. It should be noted that while HIV prevalence was not specifically researched in this study in relation to implicit attitudes towards sexual concurrency, key findings have clearly related spreads of HIV prevalence in Sub-Saharan with the spread of sexual concurrency networks (Epstein & Morris, 2011; Kenyon & Zondo, 2011; Morris, Epstein & Wawer, 2010). This related finding was the high rate of sexual concurrency reported in this study; whereby the clear majority of individuals had participated in some form of sexual concurrency at the time of the study, or in the past. In the literature, such high rates of concurrency have been described as promoting heightened risk for HIV and AIDS. Epstein and Morris (2011), for example, warn that the longer the average duration of a concurrent sexual overlap, the greater a person's risk for HIV transmission. Mah and Halperin (2010) also assert that such high rates of sexual concurrency, as observed in this study, can increase the size of the HIV epidemic, as well as the speed it permeates through a population, and how long it persists. Breaking sexual concurrency networks early is therefore of critical importance as a means of targeting HIV and AIDS in South Africa.

### **5.1.2 Hypothesis Two**

The second hypothesis of this study was that there would be a positive correlation between reported implicit and explicit attitudes towards sexual concurrency. In order to satisfy the arguments for the second hypothesis of this study, the respondents would have needed to show, with statistical significance, that there was a positive correlation between their implicit attitudes, and their reported explicit attitudes towards sexual concurrency. According to the IAT literature, as noted in studies by Babchishin et al. (2013), relating to implicit and explicit attitudes which used the IAT to measure sexual attraction to children, the study found evidence that the implicit and explicit attitudes of their respondents were correlated, suggesting that the implicit and explicit attitudes of sexually-related research topics may be related.

Arising from the above, the logic of this hypothesis was that there would be a positive correlation between the implicit attitudes of the respondents in this study, and their reported explicit attitudes towards sexual concurrency. This hypothesis therefore intended to observe whether the results of this study could complement recent evidence (Epstein & Morris, 2011; Kenyon & Zondo, 2011; Morris, Epstein & Wawer, 2010), which has found that a key explanatory driver of high HIV epidemic rates in Sub-Saharan Africa is the spread of sexual concurrency networks.

Based on the results of this study, clear correlations existed between each of the respondents' explicit attitudes towards sexual concurrency, as shown by the statistically significant, moderate positive correlations between the respondents' answers to whether or not they approved of secret, revealed or reciprocal concurrency. No correlations were observed, however, with any statistical significance, between these explicit attitudes towards sexual

concurrency, and the implicit attitudes of the respondents towards sexual concurrency, as determined by the IAT.

In deliberating this result, once again, as was observed in the results and discussed for the first hypothesis, there appeared to be considerable variation in the explicit attitudes of the individuals towards sexual concurrency, relative to their actual sexual practices, and considerable variation in the implicit IAT scores relative to either their sexual practices or their explicit attitudes. It can therefore be concluded that this hypothesis was not met with any statistical significance.

Various reasons can be postulated for this inconsistency between the expected and actual implicit cognition results. The realm of sexual psychology is a complex one, and sexual fantasy has many facets. Scholars have for eons attempted to describe the complexities of human love, passion, sexual desire and sexual behaviour (e.g. Hatfield, Luckhurst & Rapson, 2010). The potential underlying fantasies that an individual could have had towards multiple partners and concurrency could have scattered the results, with people rendering positive implicit cognitive thought processes, though explicitly averse to the practice of concurrency. Thus, while as a fantasy, the concept of concurrency may have proven appealing, but when considered at a practical level, or in reality, and upon considering the implications and actuality of the practice, it may have evoked negative explicit cognitive thought processes.

In relation to this element of the complex psychology of sexual practices, it was interesting to observe that the explicit attitudes towards sexual concurrency, for individuals who were sexually concurrent, grew more negative as the individuals 'perspectives changed from a secret sexual relationship, to an open and revealed sexual concurrency. For example, while 45 percent of individuals with a history of concurrency disagreed with secretly practicing sexual concurrency, this increased to nearly 53% disagreeing with sexual concurrency when the

sexual concurrency was revealed or undisclosed to their partners. This therefore opens new avenues of psychological complexity, in order to explain what would have rendered the act of secret concurrency slightly less unfavourable to these individuals than revealed sexual concurrency. Perhaps difficulties and issues that may have resulted from interference from the partners, such as curiosity and inquisition from the various partners, or reasons such as being labelled as promiscuous may have rendered the idea of publicised sexual concurrency less attractive, as previously described (Lundberg et al., 2011).

In summation to the second hypothesis of this study, it was not conclusively found that there was any positive correlation between the implicit attitudes, and the reported explicit attitudes of the respondents towards sexual concurrency. In support of recent research on the relation between HIV rates in Sub-Saharan Africa and the spread of sexual concurrency networks, it was clearly observed that sexual concurrency has and is being broadly practiced amongst the population that this study's sample was drawn from.

### **5.1.3 Hypothesis Three**

This hypothesis stated that age and gender would be a key determinant predictors of sexual concurrency when measure by the IAT. As noted by Psaki et al. (2013), concurrent sexual partnerships are standard among male students and becoming increasingly common among female students in South Africa, while research by Yamanis et al. (2013) on young boys between 15 and 19 years age found that age was an indicator for engaging in sexual concurrency. Thus, it was deemed logical — and worth testing in this study whether age and gender would be the most significant contributors towards concurrent relationships.

An association was clearly observed in the results, as shown by the regression analysis between the relative ages of the individuals, and their IAT scores. Although the ANOVA of

these two variables was not significant at an alpha of less than five percent, it was significant at an alpha of less than ten percent. Furthermore, age as a predictor variable for IAT score was the only variable with any semblance of statistical significance across the data sets, as none of the other predictor variables (including gender) was significant with at least 90 percent confidence. This is because high variability amongst the responses rendered statistically significant results scarce.

The results of the linear regression using age as the predictor variable confirmed that as the respondents' ages increased, so their respective IAT scores decreased. Stated differently, the older the respondents were, the lower their D-scores were, or the more pro-concurrent they appeared. Therefore, the older the respondents were, the faster they associated sexually concurrent pictures with positive words, thereby indicating a more positive implicit attitude towards sexual concurrency. This was consistently observed, with comparatively little deviation between the respondents, confirming the third hypothesis of this dissertation, that age is a key determinant for sexual concurrency, and that there is a positive correlation between age and the attitudes of individuals towards sexually concurrent relationships.

In the literature, much has been researched in an attempt to observe how demographic characteristics affect sexual concurrency, such as gender (Kershaw, Arnold, Gordon, Magriples & Niccolai, 2012), political unrest (Kinyanda, et al., 2012), race, education, income, employment status, marital status, and number of children (Carey, Scott-Sheldon, Senn & Carey, 2013). As mentioned before, age was the primary demographic characteristic found with any significance in this study that related to the literature.

In support of this study, research by Yamanis et al. (2013) on young boys between 15 and 19 years, observed that as age increased, so too did the number who had had sex (as was to be expected). Similarly, Yamanis et al. (2013) found that age was an indicator for engaging in

sexual concurrency. Although this group was younger than the respondents from this study, the arguments of Yamanis et al. (2013) that age affects individuals' attitudes and practices towards concurrency and risky sexual behaviour may apply in this case too. These authors suggested that peer pressure to engage in risky sexual activities was a factor, and as sexual experience advanced, so too did the boundaries of their sexual norms. One reason mentioned by Yamanis et al., (2013) though, which clearly could not apply in the case of this research, was that individuals "who engage in high risk sexual behaviours are often elusive to prevention programs because they may not be in school or accessible through health centres"(Bogart et al., 2011, p.2412). Since the participants of this study were all at university, the reason for such concurrency would be different, although peer pressure, or abiding by social norms, may in fact show merit. Perhaps such aspects could be studied in a future study, as discussed next.

In summary, hypothesis three was supported with moderate statistical significance, since the results of the linear regression, using age as the predictor variable, confirmed that as the respondents' ages increased, so their respective IAT scores decreased. Stated differently, the older the respondents were, the faster they associated sexually concurrent pictures with positive words, thereby indicating the more pro-concurrent they were. Therefore, age was a key determinant for sexual concurrency, and there is a positive correlation between age and the attitudes of individuals towards concurrent relationships. The same however cannot be said for gender which we did not expect to see as research clearly shows males to be more likely than females to practise concurrency.

## **5.2 LIMITATIONS OF THE CURRENT RESEARCH, AND PROPOSED SOLUTIONS**

Upon completion of this study, various limitations were observed, in the form of inconclusive results or shortcomings in the findings. Due to the sensitive nature of sexual research, particularly sexual concurrency research discussing participants' attitudes towards, and practices of sexual behaviour, some questions were left blank by many respondents. This may have had a dire effect on the results of this study, since opinions that may have altered the statistical results and significance of this study may have been excluded.

The low number of participants involved in the study also proved to be a limitation, and this was compounded by the high number of respondents who, while participating, impaired their IAT results, and were therefore excluded. This was deduced by the considerable number of respondents who entered more than ten percent of their IAT responses in less than 300ms (only 46 out of the 70 participants provided data that could be used in the IAT). As indicated in the previous chapters, response rate plays a vital role in this test. Although it was assumed that the university students would have had sufficient skills to perform a computerised test, this may have been the cause for the short response rates on their IATs. Because of this, though, the findings can only be generalised to the specific population of this study, and not to a wider population.

### **5.2.1 Directions for future research**

In order to advance on the findings of this study, and to overcome the limitations that were observed here, a larger sample size could be included in future research, in an attempt to generate results with more statistical significance, and to increase the confidence intervals of the data.

To further aid in answering the question on the relationship between sexual concurrency and HIV, it would be recommended to include variables in future research that would examine HIV knowledge, attitudes, opinions and perhaps even incidence rates; although this final factor may prove difficult to gather reliably, and in sufficient proportions to render statistically significant results.

Finally, this research would be strengthened by taking into account more of the demographic characteristics of the participants to gain a better understanding of their explicit and implicit attitudes relative to their demographics. Although race, gender and sexuality were considered in the correlation and regression analyses, no statistically significant results were observed. Further demographic analysis would allow questions to be answered such as, '*Is this culturally acceptable behaviour?*'

### **5.3 METHODOLOGICAL CONTRIBUTIONS OF THIS RESEARCH**

This study's major contribution is the methodological approach to the study of sexual concurrency, as evident by the development and implementation of the Implicit Association Test (Greenwald et al., 1998) to address previous limitations noted in the explicit measures such as questionnaires (Dariotis et al., 2009).

A psychological contribution has also been made relating to the discourse on policy development for targeting HIV and AIDS in South Africa, by generating understanding into the thought processes of peoples' sexual concurrency tendencies. It is therefore recommended that the findings of this study should be considered when contemplating the public health policies of the country. As noted in the literature review of this dissertation, Muthivhi et al (2011) argue that there are gaps and discrepancies in the knowledge of the youth relating to HIV and AIDS, and improving the attitudes of the youth towards HIV is an education issue.

Thus, policies that target the education of the population towards the risks and implications of sexual concurrency would be vastly beneficial.

#### **5.4 CONCLUSION**

There were three main objectives of this study. The first was to identify and study implicit and explicit attitudes towards sexual concurrency in a South African student population using the IAT derived by Greenwald et al. (1998). This objective has been achieved, and in so doing, has enriched the understanding of attitudes and their effect on sexual concurrency: This study has the need for developing reliable measurements to study sexual concurrency. The second objective was to understand if there was a positive correlation between the reported implicit and explicit attitudes towards sexual concurrency, and this objective has also been achieved – though it was found that there was no specific correlation. The reasons for these findings, or their deviations from what were expected values, and the implications of each of these objectives have been discussed in detail throughout this chapter. The last objective was a regression analysis to understand the key determinants of age and gender on sexual concurrency.

In conclusion it could be argued that HIV prevention methods in the region have had little effect on curbing the incidence of sexual concurrency among the population studied here, since the rates of sexual concurrency were still high. Furthermore, the sample's reasons for not performing sexual concurrency appeared to rely considerably on the aspect of duty or effect from a partner, as opposed to concerns over HIV risk (Carey et al. 2010; Lundberg, et al., 2011). Tun et al. (2012) concur with this view, and argue that South Africa has always received mixed messages and misinformation about HIV, as well as its origins, prevention strategies and treatment.

As a final word, one finding that did emanate from this study's regression analysis, with worrying consequence, was the fact that there was a positive relation between the ages of individuals and their implicit attitudes towards concurrent relationships. This suggests that the problem in society is only set to increase as individual's age, with implications in terms of HIV and AIDS being dire. In spite of the above, it is hoped that more original research will be carried out in the future to better understand sexuality and sexual concurrency in higher education settings and amongst the youth population of Sub-Saharan Africa so as to ameliorate the effects of HIV and other sexuality related illnesses.

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## **APPENDICES**

## 7.1 APPENDIX A: DEMOGRAPHIC QUESTIONNAIRE



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**Please Tick Appropriate Box to the Below Questions.**

1. Gender

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>
------	--------------------------	--------	--------------------------

2. Age

18 -19 yrs.	<input type="checkbox"/>	20 - 21yrs	<input type="checkbox"/>	22 - 23yrs	<input type="checkbox"/>	>24yrs	<input type="checkbox"/>
-------------	--------------------------	------------	--------------------------	------------	--------------------------	--------	--------------------------

3. Marital Status

Single	<input type="checkbox"/>	Married	<input type="checkbox"/>	Widowed	<input type="checkbox"/>	Divorced	<input type="checkbox"/>	Other (state)	<input type="checkbox"/>
--------	--------------------------	---------	--------------------------	---------	--------------------------	----------	--------------------------	------------------	--------------------------

4. Language proficiency

English only		Xhosa/Zulu/Sotho		Other	
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5. Highest qualification

Certificate		Diploma		Degree		Postgraduate Degree		Other(state)	
-------------	--	---------	--	--------	--	---------------------	--	--------------	--

6. Guardian Income Per Month (Please Tick Appropriate Box)

< R1000		>R1000		>R5000		> R10000
---------	--	--------	--	--------	--	----------

7. What Racial Group Would you consider yourself to be?

African		Indian		White		Colored		Other	
---------	--	--------	--	-------	--	---------	--	-------	--

**THE END**

**7.2 APPENDIX B: EXPLICIT QUESTIONNAIRE ON SEXUAL CONCURRENCY;  
ADAPTED FROM THE SOUTH AFRICAN NATIONAL COMMUNICATION  
SURVEY QUESTIONS 2009 (JOHNSON ET AL., 2010).**



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1. Have you ever had two or more sexual partners at the same time?

Yes

No

2. If yes how many?

3. Do you use a condom every time you have sexual intercourse with your partner/s?

Yes

No

4. What is your relationship with your partner/s?

Husband

Live-in partner

Casual acquaintance

Other

Partner not living together

Partner living together

5. For how long have you had a sexual relationship with the person/s

Days

Months

Years

6. What do you think about having multiple partners?

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7. Have you had a sexual partner who is 10 years older or younger?

---

8. Do you think your partner has other sexual partners?

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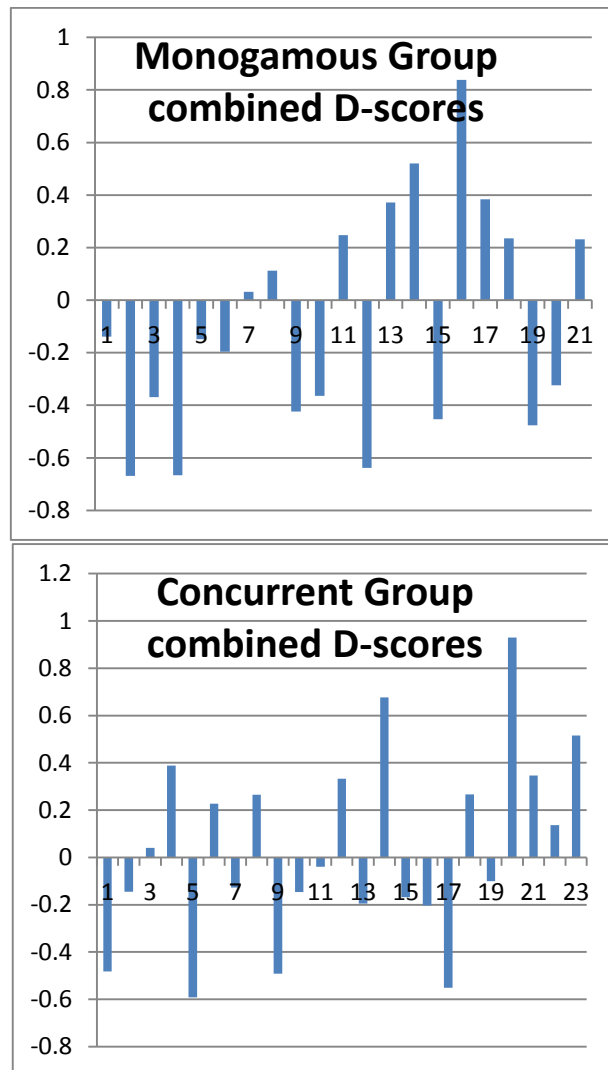
9. What are your thoughts about multiple partners and the spread of HIV/AIDS?

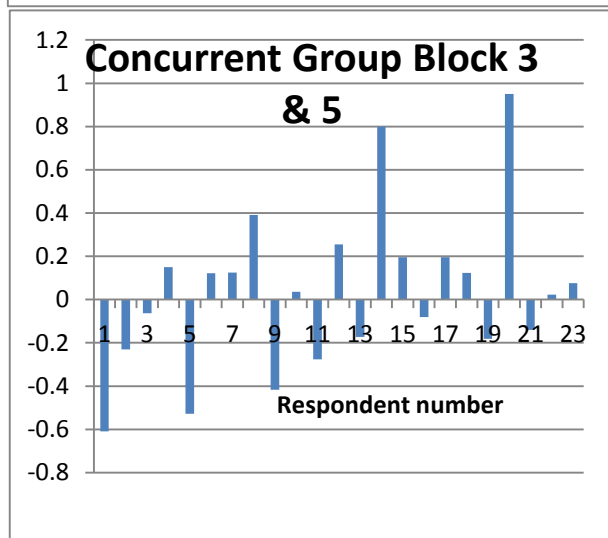
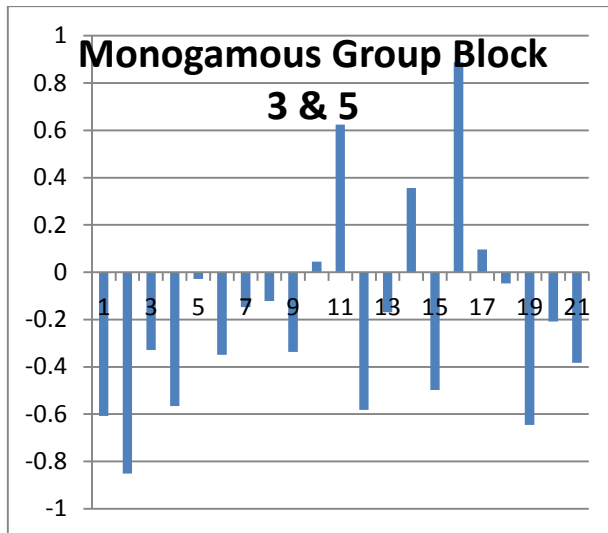
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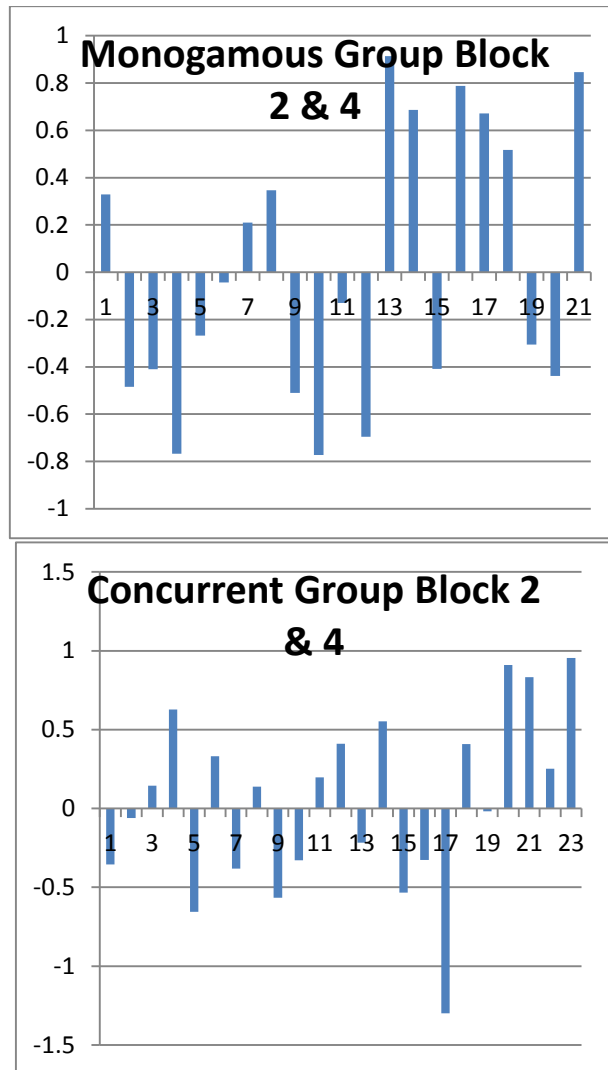
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**7.3 APPENDIX C: SPECTRUM OF INDIVIDUAL D-SCORES FROM EACH  
SEXUAL TENDENCY GROUP**







#### 7.4 TEST FOR RELIABILITY (CRONBACH'S ALPHA)

The alpha coefficient for all dichotomous, ordinal, or interval variables from the questionnaire and IAT were calculated. The alpha coefficient for the four D-Score variables (block three and five, block two and four, the combined D-score, and the log of the combined D-score) was 0.941, suggesting that these four variables, when considered together, had high internal consistency. Stated alternatively, 94.1% of the variability in a composite score, when combining these four items, would be considered as reliable, internally consistent variance.

When all applicable variables from the questionnaire were analysed together, alpha scores were slightly lower at 0.721, indicating moderate-to-high internal consistency, where 72.1%

of the variability in a composite score, when combining these ten variables, would be considered as reliable, internally consistent variance.

#### 7.4.1 Pearson's product moment correlation coefficient (PMCC)

Bivariate correlation analysis was used to determine if any two variables were linearly related to each other. Pearson's correlation co-efficient (r) was observed on each of the numerical variables, namely respondents' *age*, *total sexual partners*, *current number of sexual partners*, and separate D-scores.

Correlations that were statistically significant, ( $p < 0.01$ ), are shown with \*\*, and marked yellow in Table 7-1. A strong positive Pearson correlation was observed between the respondents' answers for their total number of sexual partners, and their current number of sexual partners ( $r = 0.748$ ,  $p = 0.000$ ), while a moderate positive correlation was observed between the respondents Block three and five D-scores, and their Block two and four D-scores ( $r=0.495$ ,  $p=0.000$ ).

**Table 7-1 Pearson's product moment correlation co-efficient (r) for nominal variables**

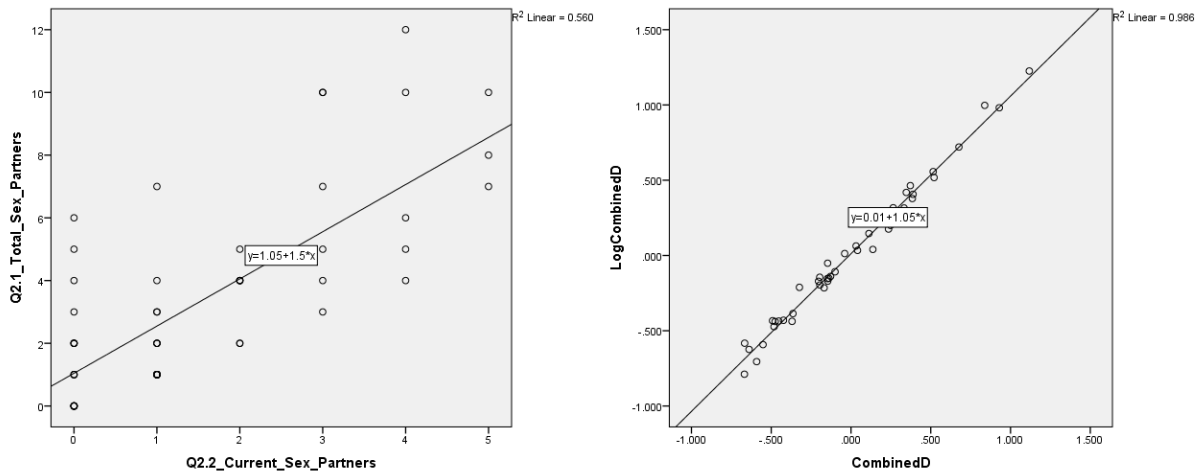
		<b>Current Sex Partners</b>	<b>Block 2 &amp; 4 D-score</b>	<b>Combined D-score</b>	<b>Log of the Combined D-score</b>
<b>Total Sex Partners</b>	Pearson Correlation	0.748**	0.080	0.135	0.112
	Sig. (2-tailed)	0.000	0.626	0.414	0.495
<b>Block 3 &amp; 5 D-score</b>	Pearson Correlation	0.116	0.495**	0.817**	0.814**
	Sig. (2-tailed)	0.476	0.000	0.000	0.000

<b>Block 2 &amp; 4 D-score</b>	Pearson Correlation	0.136	1.000	0.905**	0.897**
	Sig. (2-tailed)	0.401		0.000	0.000
<b>Combined D-score</b>	Pearson Correlation	0.153	0.905**	1.000	0.993**
	Sig. (2-tailed)	0.346	0.000		0.000

Furthermore, an almost perfect strong positive correlation was observed between the respondents' combined D-scores, and the log of their combined D-scores ( $r=0.993$ ,  $p=0.000$ ), as was to be expected.

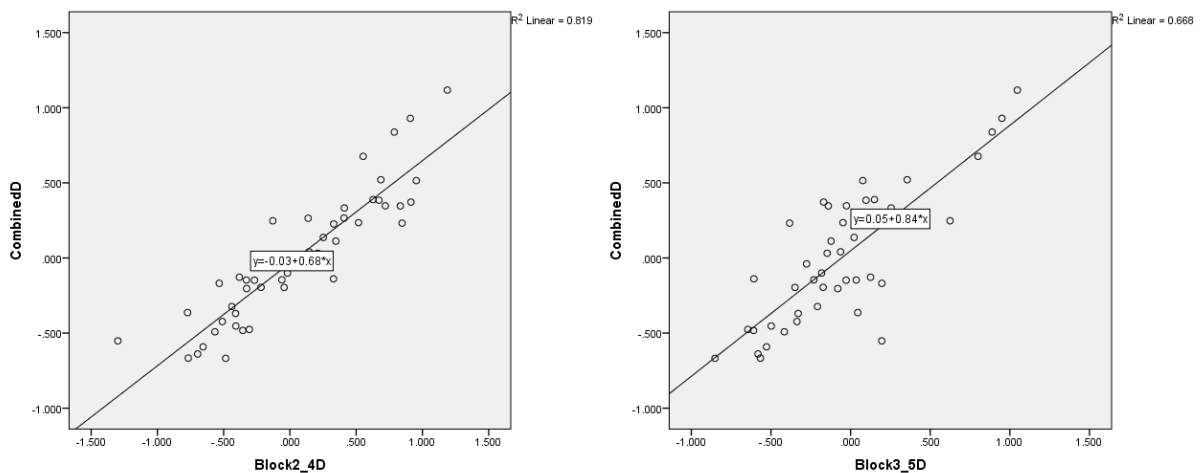
Very strong positive Pearson correlations were observed between the block three and five D-scores, the combined D-scores ( $r = 0.817$ ,  $p = 0.000$ ), and the log combined D-scores ( $r = 0.814$ ,  $p = 0.000$ ). However, this correlation was not as high as the correlation that was observed between the block two and four D-scores, the combined D-scores ( $r = 0.905$ ,  $p = 0.000$ ), and the log combined D-scores ( $r = 0.897$ ,  $p = 0.000$ ).

Scatter plots of the strong positive correlations between total sex partners and current sex partners (left), and the combined D-scores versus the log of the combined D-scores (right) are shown in Figure 10.



**Figure 10:** Scatter plots of total and current sex partners (left), and log vs combined D-scores (right)

Scatter plots of the strong positive correlations between block two and four D-scores versus the combined D-score (left), and the block three and five D-scores versus the combined D-scores (right) are also shown, in Figure 11.



**Figure 11** Scatter plots of the block 2 and 4 D-scores versus the combined D-score (left), and the block 3 and 5 D-scores versus the combined D-scores (right)

No significant correlations were observed between the respondents who noted monogamous or sexually concurrent tendencies (when considering past and current numbers of concurrent partners in the questionnaire), and their respective D-scores. Thus, there was no observable

correlation between whether a person was in a multiple relationship or had a history of sexual concurrency, and their respective biases in the IAT.

## 7.5 APPENDIX D: CONSENT FORM

<p style="text-align: center;">RHODES UNIVERSITY</p> <p style="text-align: center;">DEPARTMENT OF PSYCHOLOGY</p> <p style="text-align: center;">AGREEMENT BETWEEN</p> <p style="text-align: center;">STUDENT RESEARCHER AND</p> <p style="text-align: center;">RESEARCH PARTICIPANT</p>
---

I (participant's name) \_\_\_\_\_ agree to participate in the research project by Maleeto Malataliana \_\_\_\_\_ on Understanding Sexual Concurrency: Implicit Attitudes and Explicit Attitudes in a South African Student Population.

**I understand that:**

1. The researcher is a student conducting the research as part of the requirements for a Master's degree at Rhodes University. The researcher may be contacted on 082 506 0187 or m.malataliana@ru.ac.za. The research project has been approved by the relevant ethics committee(s), and is under the supervision of Mr SizweZondo in the Psychology Department at Rhodes University, who may be contacted on 046 603 8502 or s.zondo.ru.ac.za.

2. The researcher is interested in understanding implicit and explicit attitudes towards sexuality with the aim to enriching the understanding sexual concurrency in South Africa.

3. My participation will involve a) completing a *Demographic Questionnaire*, b) Questions from *The South African National Communications Survey 2009* and c) completing a computer generated task called the *Implicit Associations Test (IAT)*. All the above will take approximately 25 minutes to complete.

4. I may be asked to answer questions that are of a personal nature, but I can choose not to answer any questions about aspects of my life which I am not willing to disclose.

5. I am invited to voice any concerns to the researcher that I have about my participation in the study and that these will be addressed to my satisfaction. The Rhodes Counselling Centre may be contacted for further support on 046 603 7070.

6. I am free to withdraw from the study at any point during the research – however I commit myself to my full participation in the research unless some unusual circumstances occur.

7. The final report on the project will contain information about my attitudes towards sexual concurrency (implicit and explicit) but the report will be designed in such a way that it will not be possible to be identified by the general reader.

Signed on (Date):

Participant: \_\_\_\_\_ Researcher: \_\_\_\_\_

## 7.6 APPENDIX E: ETHICAL CLEARANCE



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### RESEARCH PROJECTS AND ETHICS REVIEW COMMITTEE

28 August 2013

Maleeto Malataliana  
Department of Psychology  
RHODES UNIVERSITY  
6140

Dear Maleeto

### ETHICAL CLEARANCE OF PROJECT PSY2013/26

This letter confirms your research proposal with tracking number PSY2013/26 and title, 'Understanding sexual concurrency: Implicit attitudes and explicit attitudes in a South African student population', served at the Research Projects and Ethics Review Committee (RPERC) of the Psychology Department of Rhodes University on 27 August 2013. The project has been given ethics clearance.

Please ensure that the RPERC is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators.

Yours sincerely

  
CHAIRPERSON OF THE RPERC

## 7.7 APPENDIX F: MISCELLANEOUS FINDINGS OF INTEREST BASED ON REGRESSION ANALYSIS AND D500 SCORES.

The respondents' *race*, *total number of sexual partners*, *current number of sexual partners*, whether they had a *steady partner*, and their *monogamous or concurrency* tendency were all calculated to have R-squared values between 0.018 and 0.025, suggesting that between 1.8% and 2.5% of the variability in the combined D-scores of the respondents could be accounted for by these variables. These effect sizes were adjusted to an almost negligible amount, though, due to the sample size. In addition, none of these calculations was observed to be at an alpha of less than 5% significance, as shown by the ANOVA results in Table 4-5.

The respondents' *previous concurrency*, whether they accepted *secret concurrency*, and whether they accepted *revealed concurrency* each calculated R-squared values of 0.036, 0.032, and 0.051, adjusted to 0.012, 0.010, and 0.030 respectively. Thus, 3.6%, 3.2%, and 5.1% of the variability in the combined D-scores of the respondents could be accounted for by their previous concurrency, secret concurrency opinions, and revealed concurrency opinions, which were adjusted to 1.2%, 1.0%, and 3.0% respectively. Once again, as shown by the ANOVA results in Table 4-5, these were not above the minimum 95% confidence. This means that very little prediction could be made from these variables on what final combined D-score a person would have had. Described differently, it was observed that considerable variation existed in the responses of the respondents, relative to their biases in the IAT test, to the extent that very little prediction could be made on a person's bias for concurrency over monogamy in the IAT — based on their questionnaire profiles — that would be statistically significant.

### 7.7.1 Linear regression equation

Upon consideration of the two variables with the largest effect sizes from Table 4-5 (*age* and *opinion of revealing sexual concurrency*), linear regression equations were calculated based on the equation form:

$$DV = \text{slope} * IV + \text{intercept}$$

#### 7.7.1.1 Age

As shown in Table 4-5 **Results of the linear regression, with Combined D-scores as the DV, and each variable as IV**, each one-year increase in age would result in a change in combined D-score of -0.046, and based on the correlation coefficient of -0.249, there was a slight negative correlation between these two variables. The linear regression equation for age relative to combined D-score is as follows:

$$DV = (-0.046) IV + 1.021$$

For example, based on the respondents of this study, a person 23 years of age would be expected to have a combined D-score of -0.037, calculated as follows:

$$\begin{aligned}
 DV &= (-0.046) \times 23 + 1.021 \\
 &= -0.037
 \end{aligned}$$

**Table 7-2 Linear regression equation coefficients**

Model	Unstandardised Coefficients		Standardised Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound

(Constant)	1.021	0.597		1.710	0.094	-0.183	2.224
Age	-0.046	0.027	-0.249	-1.688	0.099	-0.102	0.009
(Constant)	-0.158	0.126		-1.254	0.216	-0.412	0.096
Reveal Concurrency	0.089	0.058	0.227	1.544	0.130	-0.027	0.205

The Y-Axis intercept was 1.021, suggesting that at a theoretical age of 0 years, a person would show a D-score of 1.021, although this was only applicable as a constant value for input into the linear regression equation, rather than practically applicable. Note that the 95% confidence intervals associated with the B-values suggest that the intercept was very large. Thus, with 95% confidence it could be stated that the intercept was in fact between -0.183 and 2.224, and that with the sample size of this study, there was little confidence in the precise value of the B constant of 1.021, since it could (with 95% confidence) have been between -0.183 and 2.224. Furthermore, based on these confidence levels, the change in combined D-score following a one-year change in age could in fact have been between -0.102 and 0.009, and not the precise value of -0.046.

#### 7.7.1.2 Revealed concurrency

Finally, as shown in Table 4-5 **Results of the linear regression, with Combined D-scores as the DV, and each variable as IV**, each one-point increase in a person's acceptance of performing revealed sexual concurrency would result in a change in combined D-score of 0.089, and based on the correlation coefficient of 0.227, there was a slight positive correlation between these two variables. The linear regression equation for *revealed concurrency* relative to combined D-score was as follows:

$$\mathbf{DV = (0.089) IV + -0.158}$$

For example, based on the respondents of this study, a person who strongly agreed with concurrency, provided it was revealed to their partner — presenting a numerical value of four on an ordinal scale — would have been expected to generate a combined D-score of 0.198 in the IAT, as shown from the following calculation:

$$\begin{aligned}\mathbf{DV} &= \mathbf{(0.089) \times 4 - 0.158} \\ &= \mathbf{0.198}\end{aligned}$$

The Y-Axis intercept was -0.158, suggesting that at a theoretical numerical value of zero, a person would show a D-score of -0.158, although this was not an achievable numerical value in this question, and was only applicable as a constant value for input into the linear regression equation. Note that the 95% confidence intervals associated with the B-values suggest that the intercept was also very large. Thus, with 95% confidence it could be stated that the intercept would in fact have been between -0.412 and 0.096, and that with the final viable sample size of this study, there is little confidence in the precise value of the B constant of -0.158, since it could (with 95% confidence) have been between -0.412 and 0.096. In addition, based on these confidence levels, the change in combined D-score following a one-point change in opinion on revealing sexual concurrency, could in fact have been between -0.027 and 0.205, and not the precise value of 0.089.