

**An HIV/AIDS Prevention Intervention
among High School Learners, in South
Africa**

BY

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Declaration

I declare that this research is the original work by the author and has not been submitted in any other form to any other university. The research study was designed, implemented and written by the author. Where use has been made of the work of others, it has been duly acknowledged. The supervisors were Professor CC Jinabhai and Dr M Taylor (Department of Public Health Medicine, Nelson R. Mandela School of Medicine, College of Health Sciences, University of KwaZulu-Natal).

Signature *[Handwritten Signature]* Date *23/10/08*

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**Figure 1. Learners participating enthusiastically in the B.A.R.T. intervention,
Wentworth (2004)**

Dedication

I dedicate this thesis to my dad, Rama A. Naidoo

(30.04.1934-12.09.2006)

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Abstract

Introduction

Nearly half of all new HIV infections worldwide occur in young people aged 15-24 years. Risky sexual behaviours may lead to the development of lifelong negative habits like having multiple partners, thereby placing young people at risk of a broad range of health problems, including HIV/AIDS. Prevention is therefore critical and includes changing behaviours that are risky, such as the early age of sexual initiation, having many sexual partners and non-use of condoms. The study aimed to evaluate whether a theory based HIV/AIDS intervention, 'Be A Responsible Teenager' (B.A.R.T.), could produce behaviour change among high school learners in South Africa.

Methods

A pre-test /multiple post-test intervention study was undertaken. All Grade 10 learners (n = 805) from all three public high schools in Wentworth were included in the study. Eleven teachers were interviewed from these schools. Learners completed a questionnaire at baseline (T1), immediately post intervention 1 (T2), post intervention 2 (T3) and after a period of seven months (T4). The B.A.R.T. intervention was implemented in the intervention schools while the control group did not receive any intervention. Qualitative data was analyzed according to themes, while quantitative data was analyzed cross sectionally and longitudinally.

Results

Teachers reported many obstacles in implementing the HIV/AIDS Life Skills' curriculum, including the poor quality of training and inadequate resources in schools. Further, learners practised high-risk sexual behaviours. Gender differences in sexual behaviour were reported with males predominately practising higher risk behaviours than females. The B.A.R.T. intervention did show changes in behaviour for alcohol use at last sex and for the determinants knowledge, attitudes, beliefs, self-efficacy and intentions to practise safer sex respectively, over time. However, the intervention did not positively impact abstinence behaviours, condom use and the reduction in partners. Further, subjective norms did not change.

Conclusion

The major obstacles to AIDS prevention include the current practices of risky sexual behaviours including age mixing, early sexual initiation, multiple partners, forced sex and receiving money or gifts for sex among others. Social norms as portrayed by parents, peers and religious groups play a pivotal role in promoting protective sexual behaviours. The role of gender and the gaps in LHAP (Life Skills' HIV/AIDS programme) also require urgent attention.

Abbreviations

AIDS – Acquired Immune-Deficiency Syndrome

ARVs – Antiretroviral

ATIC – Aids Training and Information Centre

B.A.R.T. – Be a Responsible Teenager

CDC – Centre for Disease Control

COLTS – Culture of Learning and Teaching in Schools

CG – Control Group

FHI – Family Health International

GBV – Gender Based Violence

GLM – Generalized Linear Regression Models

HBM – Health Belief Model

HIV – Human Immune-Deficiency Virus

IMB – Information, Motivation and Behaviour Skills

ICM – Integrated Change Model

IG – Intervention group

LHAP – Life Skills' HIV/AIDS Programme

LO – Life Orientation

NGO – Non-Governmental Organization

OBE – Outcomes Based Education

OR – Odds Ratio

PPM – Precede-Proceed Model

SCT – Social Cognitive Theory

STI – Sexually Transmitted Infections

Time 1 = T1; Time 2= T2; Time 3= T3; Time 4= T4

TM – Transtheoretical Model

TPB – Theory of Planned Behaviour

TPM – Theory of Protective Motivation

TRA – Theory of Reasoned Action

SCM – Stages of Change Model

UNAIDS – United Nations Joint Programme on AIDS

VCT – Voluntary Counselling and Testing

WAAG – Wentworth AIDS Action Group

WHO – World Health Organization

YRBSS – Youth Risk Behaviour Surveillance System

Definitions

For the purpose of this study, the following definitions should be noted:

Adolescent – A person between the ages of 10-19 years. A specific developmental stage from puberty into young adulthood, characterized by transitions in physical and emotional development.

Determinants of Sexual Behaviour- Knowledge, Attitudes, Beliefs, Subjective Norms, Self–efficacy & Intentions

Forced sex – Coercive circumstances where there is application of force, threats, abuse of power or authority, use of drugs, etc. with the purpose of engaging in sexual intercourse. Also includes sex without consent and is an equivalent word for rape

Incidence of HIV –The number of new infections of HIV in a given time period

Life Orientation – The study of the self in relation to others and to society, with special emphasis on the development of balanced and confident learners

Life Skills – The adaptive and positive proficiencies that enable one to deal with the challenges in everyday life

Prevalence of HIV – The number and proportion of people who are currently living with HIV

Protective Behaviours – Abstinence, reduction in partners and consistent condom use

Rape – The unlawful & intentional act which causes penetration to any extent whatsoever by the genital organs of that person into or beyond the anus or genital organs of another person. Includes sexual violation & oral genital violation (*Sexual Offences Amendment Bill- No 25282 July 2003*)

Sexual Risk Behaviour – Any sexual behaviour that is detrimental to learner’s physical and mental well being, and that promotes sexually transmitted infections, pregnancy, forced sex, use of alcohol before sex, inconsistent/lack of condom use, involvement with multiple partners, etc.

Safe Sex – Delay in first sexual experience, consistent condom use at last occasion of having sex and a decrease in the number of sexual partners in the past three months

High Abstinence – High abstinence refers to a prolonged period without sexual activity among those who are already sexually active

Sexual Intercourse – Includes vaginal, anal and /or oral sex

Sexual Behaviour – The set of behaviours and practices that define sexual risk for HIV, including partnership characteristics, sexual networking, sexual initiation, number of sexual partners.

Youth/young people – 15 to 24 years of age (WHO, 2006)

Chapter 1: Introduction

It is estimated that 2.3 million children under 15 years of age are infected with HIV globally, 15.2 million children under 18 have lost one or both parents to AIDS, and millions more have been made vulnerable (UNAIDS/WHO/UNICEF, 2007). Every day, 5 000 young people aged 15-24 years become infected with HIV, almost 2 million new infections every year (Roos *et al.*, 2006). More than 10 million of the estimated 40 million people living with HIV are young people and nearly half of new HIV infections worldwide occur in young people aged 15-24 years (UNAIDS, 2006; Kaiser Family Foundation, 2004). The risks inherent in these statistics are many, as children affected by AIDS may experience poverty, homelessness, school drop-out, discrimination, loss of life opportunity and early death (UNAIDS/WHO/UNICEF, 2007).

Risky sexual behaviour among adolescents is one of the major public health issues in the United States with an increase in early sexual initiation and concerns about young people not being psychologically and emotionally mature enough to deal with possible health and interpersonal consequences related to sexual intimacy (Le and Kato, 2006). South Africa continues to have one of the highest prevalence rates of HIV in the world (Department of Health, 2000b; UNAIDS, 2006). Overall the HIV prevalence for learners between 15 to 24 years in South Africa is 10.3%; with 4.45% for males and 16.9% reported for females (Shisana *et al.*, 2005b). More specifically, among 15-19 year olds the prevalence is 3.2% for boys and 9.4% for girls. In addition, KwaZulu–Natal has the highest HIV prevalence rate of 16.1% among respondents aged 15-24 years (Shisana *et al.*, 2005b). These figures illustrate the urgency to step up prevention efforts among adolescents, in order to reverse the epidemic.

Twenty–five years into the epidemic and far too little is being done to prevent new infections in young people (UNAIDS, 2006). The vicious cycle of a growing number of new infections, the larger burden of disease and worsening socio–economic conditions in much of Africa, perpetuates the AIDS epidemic (Odutolu, 2005).

South Africa’s youth, under the age of 20 years, comprise approximately 43% of the country’s total population of 44.8 million and almost 12.5 million children are enrolled in schools (Bhana, 2004). It is therefore critical to understand the determinants of sexual behaviour that have led and continue to lead South African young people, to be increasingly vulnerable and susceptible to the Human Immuno–Deficiency Virus and Acquired Immuno–Deficiency Syndrome (HIV/AIDS). The prevalence and spread, of the HIV/AIDS epidemic, are determined by social, political, structural and economic factors in South Africa, which provide an ideal habitat for the virus to survive, thrive and grow (Shisana *et al.*, 2005b). A context in which youth face transitions, such as rapid urbanization, changes in work opportunities, social disintegration, a loss of traditional lifestyles to westernization and post–democracy political transitions, which together offer fertile ground for an HIV/AIDS epidemic. This wider view incorporates the normative, social, cultural and economic influences that are shaping young people’s sexual desires and experiences (Leclerc–Madlala, 2002).

In addition, the period of adolescence is itself a transitional stage of development, in which new behaviour patterns emerge, including experimentation with sexual behaviours. However

these behaviours may lead to the development of lifelong negative habits such as sexual experimentation with multiple partners, thereby placing young people at risk of a broad range of health problems, including HIV/AIDS (Shisana *et al.*, 2005b). Further, South African youth have articulated their beliefs that they are at low risk for HIV infection and hence risk-taking as a way of life is a barrier to sexual health (Friedland *et al.*, 1991; Maart, 1998; Kelly, 2000).

Before individuals and communities can reduce their level of risk, they need to understand the facts about HIV/AIDS, adopt key attitudes, learn skills, and be given access to appropriate commodities and services (Farmer and Lawrenson, 2004). The health of learners in this society depends on the provision of health care and the prevention of the spread of disease (Farmer and Lawrenson, 2004). Prevention is therefore critical and includes helping people to change behaviours that put them at risk, such as early sexual initiation, multiple sexual partners and non-use of condoms. These behaviours are usually embedded in deep social, economic and cultural patterns (Boler and Jellema, 2005). The prevention of AIDS therefore depends on effective interventions that target behaviour change. Behaviour change communication is one of the key preventative interventions to promoting and sustaining individual, community and societal behaviour change in this era of AIDS (Shisana *et al.*, 2005b). Knowledge of HIV is high in most places in Africa but there is little evidence of behaviour change (Magnani *et al.*, 2001; Odutolu, 2005). However, theory-based HIV interventions have been found to be effective in promoting long-term behaviour change among learners (Jemmott *et al.*, 1992a; St. Lawrence *et al.*, 1995; Auslander *et al.*, 1996; Hubbard *et al.*, 1998; Kirby *et al.*, 2004). In reviewing effective interventions, studies

published to date indicate that a conceptual foundation grounded in social learning theory was found to be one of the key elements for successful behaviour change (USAID, 2006a).

The South African, national approach to prevention has largely focused on the ABC strategy (abstain, be faithful and condomize). However this framework is simplistic and fails to incorporate broader concepts of having the power to negotiate sex free of coercion (Billowitz and Kukke, 2004). It is therefore not practical, given the high rates of forced sex and domestic violence reported in South Africa (Jewkes and Abrahams, 2002). In addition to the ABC strategy, the introduction of Life Skills' programmes into schools is one of the main focuses in HIV prevention among learners, and is now a compulsory part of the school curriculum (Department of Education, 2003b). The implementation of Life Skills' programme in high schools in Durban Metro and Mtunzini Magisterial Districts from 1999 to 2001, reported a 90% increase of trained teachers in Life Skills' (Brown *et al.*, 2001). Seventy-six percent of schools had a set curriculum for Life Skills', while the remaining schools covered some aspects of curriculum. The study concluded that, by 2001, most learners in the study area were exposed to information that could help them reduce their risk of Sexually Transmitted Infections (STIs), pregnancy and HIV/AIDS in high schools (Brown *et al.*, 2001).

Contrary to these findings, James *et al.*, (2006a) reported that there was a definite gap between HIV awareness and actual behaviour change, among learners in South African schools. AIDS education is now a compulsory, examinable subject in South Africa, yet there is still no

decrease in prevalence of HIV/AIDS among South African learners (Shisana *et al.*, 2005b). In addition, there are general reports of HIV/AIDS in several South African schools with increasing absenteeism among both teachers and learners (Shisana *et al.*, 2005a). Research among learners in South Africa reported that the number of learners enrolled in the first year of primary and high schools in 2001 in KwaZulu–Natal was 20% lower than in 1998, suggesting that more children were becoming infected or not living long enough to start school or survive their years of schooling (UNAIDS, 2006). The Democratic Teacher’s Union indicated that there was a 40% increase in AIDS–related deaths amongst teachers from 2000–2001 (UNAIDS, 2006), which further exacerbates the problems in the education system (Shisana *et al.*, 2005a).

In keeping with the national HIV/AIDS strategic plan for South Africa (2000–2005), in which one of the key priority areas is prevention and the promotion of safe and healthy sexual behaviours (Department of Health, 2000a), the researcher undertook the task of designing and implementing an HIV/AIDS prevention intervention for learners, in the community of Wentworth hospital. The integration of HIV/AIDS interventions from health facilities into community schools is an innovative approach to prevention, which could have a dynamic impact on the lives of many South Africans. In addition to the public health imperative to reduce HIV risk among youth, a deeper understanding of the factors influencing HIV risk is critical for altering the nature and course of the epidemic in South Africa (Singh *et al.*, 2006). Further, the Convention on the Rights of the Child stipulates that institutions, services and facilities are responsible for the care and protection of children, particularly in the areas of

safety and health (Convention on the Rights of the Child, 1990). The research question of this thesis therefore asks whether a theory-based HIV/AIDS prevention intervention can promote behaviour change among adolescent high school learners in South Africa. More specifically the objectives of the study included the following:

Objectives

1. To evaluate the current practice of Life Skills'' education with specific reference to HIV/AIDS, from the teacher's perspective.
2. To investigate the practice of sexual risk behaviour among high school learners.
3. To assess HIV/AIDS knowledge, attitudes, beliefs, subjective norms, self-efficacy and intentions of learners.
4. To implement a HIV/AIDS prevention intervention for high school learners.
5. To evaluate behaviour, and determinants, changes over time between the intervention and control groups.
6. To make recommendations for educational policy and AIDS prevention agendas for youth.

The present AIDS crisis and its impact on the youth of South Africa has motivated the researcher to design, implement and evaluate an HIV/AIDS prevention intervention for youth. Figure 2 below outlines the time frames of the study and Figure 3 shows the flow of learners at different time points in the intervention and control groups. The total number of learners in all three schools was 805. Cross sectional analysis revealed that at each time point a large number of data were missing and these learners were excluded from the analysis. The number of learners decreased over time with time 4 recording the highest number of missing data.

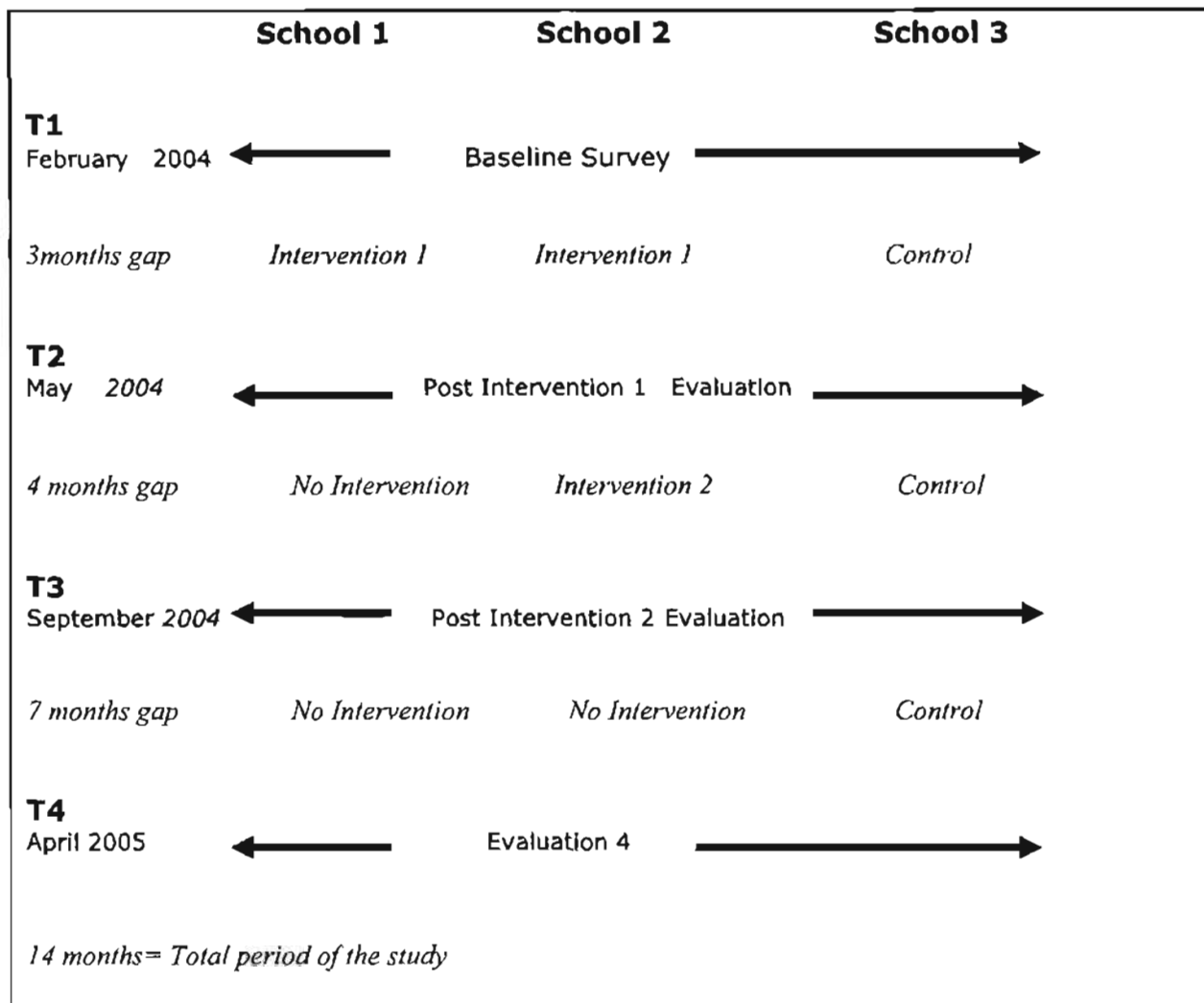


Figure 2. The four time points of the evaluation periods, intervention periods and no intervention period.

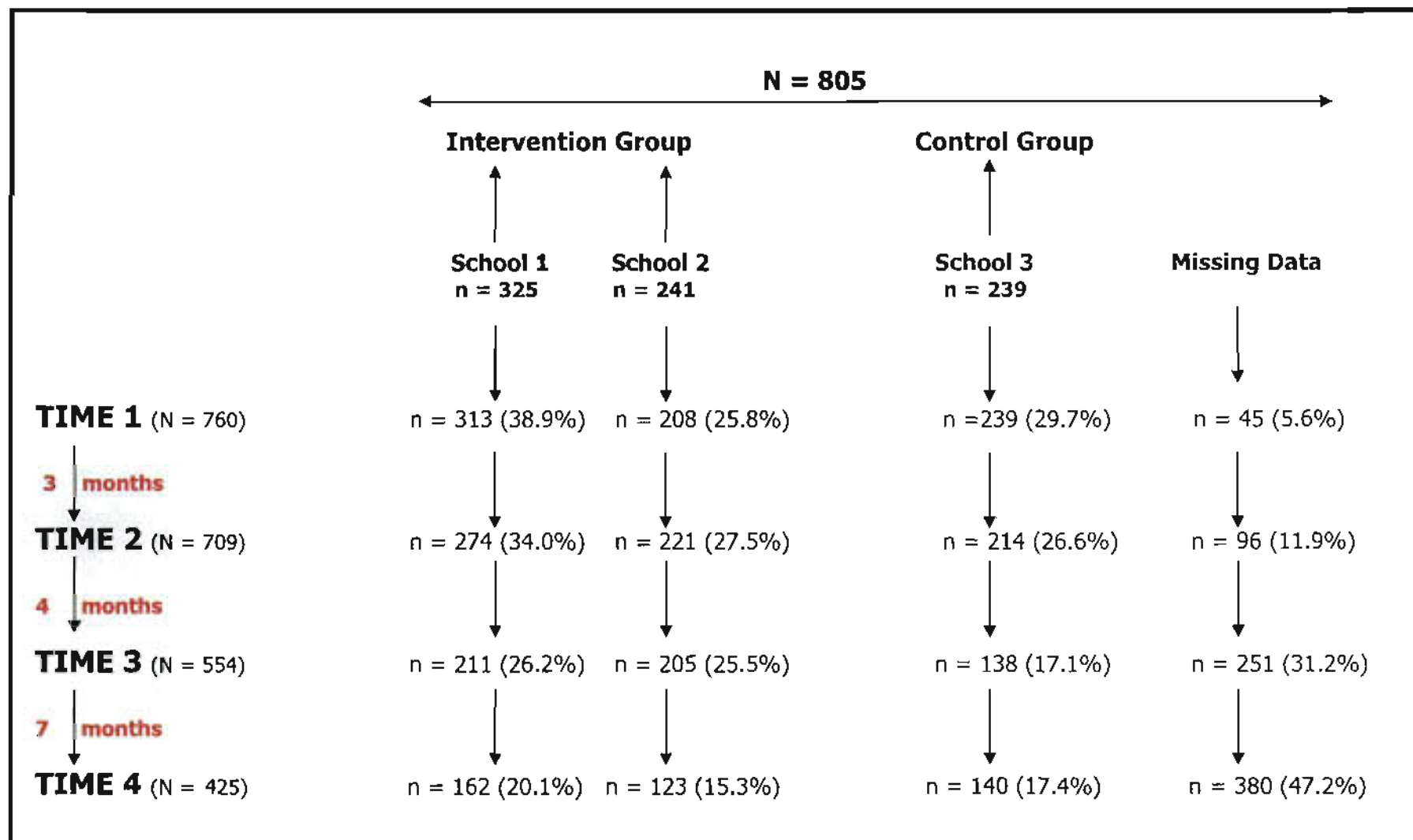


Figure 3. The numbers of learners at different time points, in intervention and control groups and the total number of learners that exited the study at each time point (missing data)

The thesis is presented in nine chapters. The epidemiological justification in the introduction has provided clear motivation for the study. The literature review elaborates on the theories of behaviour change, sexual risk behaviours of youth and their determinants, the culture of learning in South Africa and preventative interventions. The research methodology chapter outlines the basic study design, sample, procedures and process evaluation. The results are presented in separate chapters, namely focus group discussions, teacher interviews, baseline results and impact evaluation. Each chapter includes an introduction, methodology, results, discussion and conclusion in keeping with the objectives of the study. The limitations, conclusion and recommendations chapters follow.

Chapter 2: Literature Review

This chapter presents a comprehensive overview of themes in keeping with the focus areas of the thesis. A summary of the salient sections is presented and the critique draws on the gaps and justification of the theory, intervention and methodology.

2.1. An Overview of Behaviour Change Theory

2.2. Sexual Behaviour among Youth

2.3. Demographics and Determinants of Sexual Behaviour: Mediating Factors

2.4. The Culture of Learning in South Africa and Policies that Guide Learning

2.5. Youth HIV/AIDS Preventative Strategies and Interventions

2.6. Critique of Literature Review

2.1 An Overview of Behaviour Change Theory

Behaviour change is a complex process which is often difficult to achieve and sustain. In an effort to encourage healthy behaviours, social, psychological and environmental factors have been identified as key determinants of behaviour change. Theoretical models are often used to explain how behaviour changes and acts as a tool to identify gaps in interventions. Theories that are woven together have a greater predictive ability than when used alone (Karen *et al.*, 1990). A summary of the theoretical models and the rationale for the selection are considered in (Table 1, p 11) below.

Table 1. Summary of Social Cognitive Models

Theory	Rationale
<p>Theory of Reasoned Action (TRA) <i>(Fishbein & Ajzen, 1975)</i> and the Theory of Planned Behaviour (TPB) <i>(Ajzen, 1985;1991)</i></p>	<ol style="list-style-type: none"> 1. The Theory of Reasoned Action suggests that a person's behavior is determined by his/her intention to perform the behavior and that this intention is, in turn, a function of his/her attitude toward the behavior and his/her subjective norm. 2. The best predictor of behavior is intention. Intention is the cognitive representation of a person's readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior. 3. This intention is determined by three things: their attitude toward the specific behavior, their subjective norms and their perceived behavioral control. 4. The Theory of Planned Behavior holds that only specific attitudes toward the behavior in question can be expected to predict that behavior. 5. In addition to measuring attitudes toward the behavior, we also need to measure people's subjective norms – their beliefs about how people they care about will view the behavior in question. 6. To predict someone's intentions, knowing these beliefs can be as important as knowing the person's attitudes. 7. Finally, perceived behavioral control influences intentions. Perceived behavioral control refers to people's perceptions of their ability to perform a given behavior. These predictors lead to intention.

Theory	Rationale
<p>The Health Belief Model (HBM) <i>(Janz and Becker, 1984)</i></p>	<p>Focuses on five factors that promote behaviour change, namely:</p> <ul style="list-style-type: none"> a. <i>Perceived severity</i>: the belief that a health problem is serious. b. <i>Perceived threat</i>: the belief that one is susceptible to the problem. c. <i>Perceived benefit</i>: the belief that changing one's behaviour will be due to the benefit. If costs/threats are great or immediate and benefits are few, there is little chance of behaviour change. d. <i>Perceived barriers</i>: the perception of the obstacles to changing one's behaviour. e. <i>Self-efficacy</i>: the belief that one has the ability to change one's behaviour
<p>Social Cognitive Learning Theory (SCT) <i>(Bandura, 1986)</i></p>	<ol style="list-style-type: none"> 1. <i>Reciprocal determinism</i>: a triadic, dynamic and reciprocal interaction exists between personal factors, behaviour and the environment. 2. Behaviour is regulated largely through cognitive processes. The mind actively constructs one's reality, encodes information, performs behaviour and imposes structure on actions. 3. Cognitions also change over time as a function of maturation and experience. 4. By observation of models an individual's perceptions and actions influence cognitive development. 5. It includes the following constructs:

Theory	Rationale
	<ul style="list-style-type: none"> a. <i>Reinforcement</i>: positive or negative consequences of behaviour. b. <i>Behaviour capability</i>: one needs to learn what to do in order for behaviour change to occur. c. <i>Expectancies</i>: how important to the person are the anticipated results of the behaviour change. d. <i>Self-efficacy</i>: belief in one's ability to change ones behaviour and execute complex skills successfully.
<p>Theory of Gender and Power (Connell, 1987)</p>	<ol style="list-style-type: none"> 1. The theory of gender and power is a social structural theory addressing the wider social and environmental issues surrounding women, such as distribution of power and authority, affective influences, and gender-specific norms within heterosexual relationships. 2. In heterosexual relationships the theory can help investigate how a woman's commitment to a relationship and lack of power can influence her risk reduction choices. 3. Programmes using the theory of gender and power would assess the impact of structurally determined gender differences on interpersonal sexual relationships.
<p>The Integrated-Change Model (ICM) (De Vries et al., 2005)</p>	<ol style="list-style-type: none"> 1. It integrates concepts from all the models described above. 2. It has been used to explain a variety of health behaviours in different settings.

Theory	Rationale
<p>Theory of Protective Motivation (TPM) <i>(Ying et al., 2005)</i></p>	<ol style="list-style-type: none"> 1. It explains behaviour change in terms of threat and coping appraisal. 2. Environmental & personal factors combine to pose a potential health threat. 3. The threat message initiates two cognitive processes: <i>threat appraisal & coping appraisal</i>. 4. The threat appraisal process evaluates factors that create danger while the coping appraisal evaluates one's ability to cope with the threatened danger. These two appraisal pathways combine to form protective motivation to change behaviour.

2.1.1 Summary of Theories

Social Cognitive Theories have many similarities in explaining behaviour change. The focus on one's cognitions as being a central aspect to decisions regarding sexual behaviour is reiterated by all theorists. Further, as humans are social beings, beliefs and attitudes about sexual behaviour are shaped in social relationships with significant others (peers, teachers, family, spiritual leaders, etc.) and by media (visual and written) as discussed in the Theory of Reasoned Action (Fishbein and Ajzen, 1975; Bandura, 1986). These factors are therefore essential to explore more closely in order to establish the decision making process in terms of risky sexual behaviours of young people.

The Precede–Proceed model serves as a guide in planning, implementing and evaluating health promotion efforts. Individuals are however parts of a larger system and the dynamic and reciprocal nature of behaviours make it difficult to adopt any one model of behaviour change. Further the Stages of Change Model provides a framework for explaining behaviour and is particularly suitable for explaining young people’s behaviour due to the transient changing nature of their behaviours and decision making process (Prochaska *et al.*, 1994).

The theory of gender is of particular relevance to the area of sexual and reproductive health as decision making processes are largely determined through gender specific norms. For example, power imbalances exist in sexual decision making regarding condom use. This factor compounds the AIDS epidemic and is a prohibiting factor to curbing prevalence rates especially among youth.

The relevance of Social Cognitive Theories to the African context has been discussed widely (Fitzgerald *et al.*, 1999; Odutolu, 2005). In a review of HIV/AIDS prevention programmes in Malawi, Zambia, Uganda and Kenya, the use of the Social Learning Theory was advocated as a foundation for programme development (Nduati and Kiai, 1997). The incorporation of active learning methods, role plays and skills building and the use of peer education were recommended (Nduati and Kiai, 1997). Individual approaches to behaviour change however exclude the social context and norms of behaviour. In essence people do not behave in isolation from their environments. Africans are especially not individualistic and their actions

are guided by social norms and traditional practices which have to first be accepted by these communities (Odotolu, 2005).

This thesis has drawn from the rich array of concepts and constructs of Social Cognitive Models, which have proven to be effective in promoting and explaining behaviour change in various health settings through rigorous field testing. Further, Family Health International (2006) has recommended that curricula based on sound theory and research backgrounds are effective in promoting positive behaviour outcomes (Kirby *et al.*, 2006b). Although the TRA/TPB is the key focus of this thesis, it is acknowledged that behaviour change cannot be compartmentalized into models but is a product of multidimensional factors that work together to produce change (Karen *et al.*, 1990).

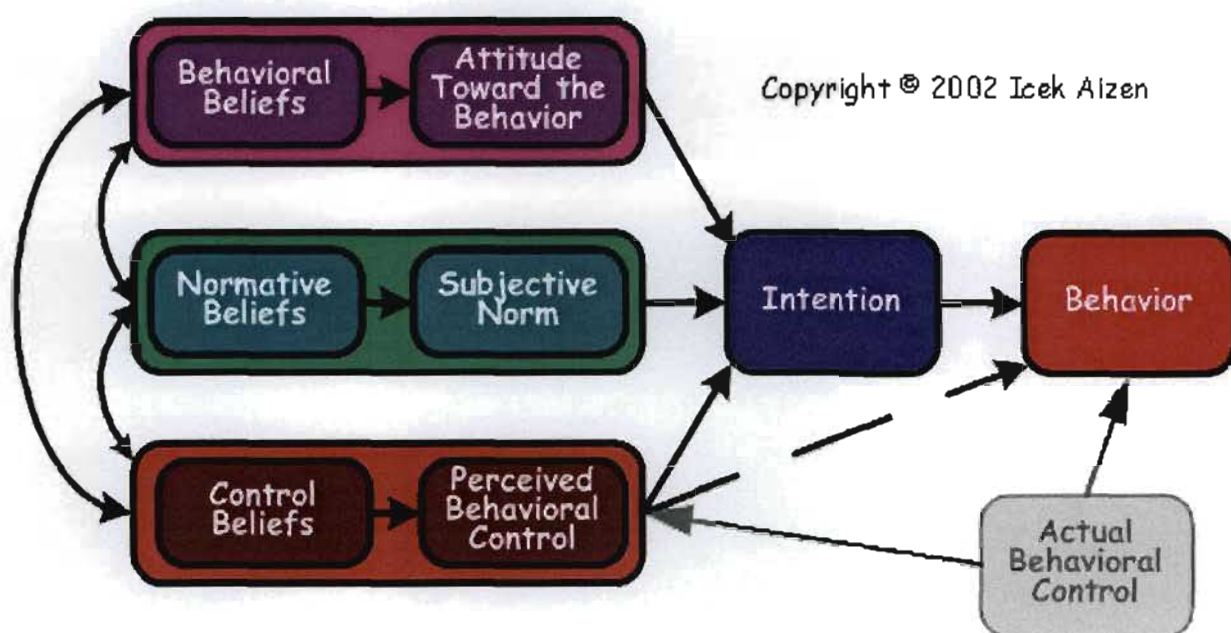


Figure 4. Conceptual Model of the TRA/TPB (Ajzen, 1991)

2.2 Sexual Risk Behaviour Among Youth

Adolescent morbidity and mortality are often not due to diseases but preventable behaviours in interaction with social and environmental factors (Wild *et al.*, 2004). In fact HIV/AIDS is often called an epidemic of young people, especially women (Harrison, 2005). The HSRC survey reported that 57.9% of South African youth between the ages of 15-24 years reported having ever had sex, with a higher proportion of females (62.3%) as compared to males (53.9%) reporting having ever had sex, (Shisana *et al.*, 2005b). Risk behaviours therefore compromise physical health as well as psychological and social outcomes (Wild *et al.*, 2004; Harrison, 2005).

The underlying etiology for adolescent risk behaviours has been linked to low self esteem among high school learners from Cape Town, South Africa (Wild *et al.*, 2004). Specifically low self-esteem with respect to family and school were found to be the most important predictors of risk behaviours including sexual behaviour (Wild *et al.*, 2004).

Gender differences in the perception of risk, among young children (11 to 24 years) have also been reported (Noell *et al.*, 1993; Richter *et al.*, 1993). Young girls expressed concern about birth control, pregnancy and violence, including alcohol use and abusive relationships; whereas boys expressed concern about condom use and pregnancy. Both boys and girls associated alcohol use with problematic situations, including decreased condom use and increased number of partners (Stewart *et al.*, 1999). This is confirmed by studies in the United

States where African American female adolescents' substance use, was a statistically significant predictor of sexual risk behaviour, while social support and self-efficacy were not (Bachanas *et al.*, 2002). Sexual risk behaviours therefore, are predictors of other risky behaviours which aggravate the former. This pattern is fairly consistent with Jessor's theory of problem behaviour (Jessor and Jessor, 1977), which suggests that problem behaviours such as alcohol and drug use, delinquency and precocious sexual activity tend to be associated with each other. However the relation between sexual activity and other risky behaviours are complex when one considers income levels, race groups and other demographic contributors. Hence problem theory may not be the best explanation for these findings (Bachanas *et al.*, 2002).

In South Africa gender role norms about sexual expression and negotiation among females, decreases protection from pregnancy and disease, and increases vulnerability to HIV and other STIs (Harrison, 2005). Social norms of women in South Africa revolve around not being able to negotiate condom use because of fear of appearing promiscuous (Varga, 1997) to having concerns about reduced sexual pleasure if condoms are used (Wood, 2000). Multiple partners have further been defined as a feature of successful manhood (Varga, 1997) and single women are regarded as socially isolated (Mager, 1999). In these circumstances many women would find dictating condom use or sexual refusal difficult (Jewkes and Abrahams, 2002).

The social situation in South Africa which is characterized by poverty, lack of opportunity and social disempowerment, also influences feelings of masculinity and femininity, which impact on sexual relationships. In addition the social construction of female and male sexuality and the profound inequalities that characterize many heterosexual relationships in Africa reinforce the high prevalence of AIDS (Aniekwu, 2002). Gender inequalities and intimate partner violence have increasingly become critical influences on the HIV epidemic in South Africa (Jewkes *et al.*, 2003). For women, social norms defining acceptable behaviour characteristics and responsibilities, economic dependency and violence make them vulnerable, while ideals of masculinity associated with risk-taking and sexual conquest also create vulnerability in men (Jewkes *et al.*, 2003). Among Zulu adolescents there are gender specific behavioural norm expectations. For example a dignified and sexually attractive female was judged according to physical appearance, educational achievement, sexual fidelity and in her ability to attract and maintain multiple sexual partners (Leclerc-Madlala, 2002). Culturally, sex continues to be defined primarily in terms of male desire with women being passive recipients of the 'male passion' (Odutolu, 2005). These relationships and gender imbalances persist in much of Africa.

Qualitative studies in South Africa have examined the meaning behind multiple sexual partnerships of young men. In these studies young men's efforts to secure *isoka* (womanizer) status were exposed, as well as the strong peer pressure and social norms that condone sexual violence and impede safer sex practices (Varga, 2003). In support of the influence of peer pressure, especially among young men, Oliver, (1996) reported that South African adolescent boys nominated their peers as having the strongest influence on sexual activities, while girls

nominated religious beliefs and their mothers. Further, masculinity was equated to being well-groomed, financially well-off, educated, sexually active and aggressive; as might be judged by having repeated episodes of sexually transmitted infections (Varga, 2003). Preston-Whyte, (1988; 1994) also reported that for male adolescents early fatherhood is a welcomed affirmation of masculinity, maturity, strength and sexual prowess. Further she suggested that fertility was an integral part of the 'cultural construction of the female self'. The 'fertility conundrum', where girls are pressurized to prove their fertility before marriage, serves as a barrier to safer sex (Preston-Whyte and Zondi, 1991). South African learners are therefore vulnerable and confused in negotiating sexuality in this context (Leclerc-Madlala, 2002).

The age of sexual initiation is another area of sexual behaviour that increases adolescents' vulnerability to poor sexual health outcomes. Demographic factors again impact on sexual behaviour directly, including poverty, family structure, parenting practices, school underachievement and involvement in other risk behaviours (Santelli *et al.*, 2004b). Among a sample of middle school adolescents, from Washington, DC, personal and perceived peer norms about refraining from sexual intercourse, was a strong protective factor against initiating sexual intercourse while alcohol and drug use was found to consistently increase the risk of sexual initiation (Santelli *et al.*, 2004b). Self-efficacy to practice safe sex showed a protective effect among Grade 7 learners and increased risk for initiating sex in Grade 8 (Santelli *et al.*, 2004b). Belonging to the male gender or the Black race group increased the likelihood of sexual initiation, together with doing poorly in school (Santelli *et al.*, 2004b).

In a study of the age of onset of sexual activity among South African learners, it was reported that learners became sexually active on average between the ages of 13 to 15 years (Richter, 1996). Such statistics coincide with information received from provincial hospitals in the greater Durban area, where girls as young as 13 years are currently being diagnosed HIV positive (Leclerc–Madlala, 2002). The Youth Risk Behaviour Surveillance System reported that nationally 14.4% of learners reported having had their first sexual experience before the age of 14 years (Reddy *et al.*, 2003). Further, more males (25.4%) than females (5.6%) were sexually active below the age of 14 years irrespective of race (Reddy *et al.*, 2003). The early age of sexual initiation (14 years or younger) was similar to African American adolescent girls (Bachanas *et al.*, 2002). Therefore teens who initiate sex at younger ages are at risk of contracting HIV and other STIs, as they are likely to have more sexual encounters, more lifetime partners and are less likely to practice safer sex than teens who delay intercourse (Bachanas *et al.*, 2002). Further younger teens who initiate sex early are especially vulnerable, because developmentally, cognitively and emotionally, they are least equipped to handle the demands of communicating with their partners about condom use (Bachanas *et al.*, 2002).

In Zambia, age at first sex was reportedly higher with the median age of first intercourse being 15 years for males and 16 years for females (Magnani *et al.*, 2002). A recent South African survey among learners aged 15-24 years reported that the median age of first sex was 17 years for both sexes (Shisana *et al.*, 2005b). As risk factors of physical or sexual abuse and skipping school increased, so did the likelihood of Caribbean learners reporting ever having had intercourse (Blum and Ireland, 2004). School connectedness (whether you liked

school/teachers), was the single strongest factor associated with reporting not having had intercourse, while religious attendance had the weakest affect on reported sexual initiation (Blum and Ireland, 2004).

The type of sexual partners that learners choose also predisposed them to poor sexual health. The involvement of young women with older wealthier men partially explains the gender differences in age specific HIV prevalence in South Africa (Jewkes *et al.*, 2003). Dependence on men for financial contributions makes women less likely to succeed in negotiating protection, and leaving a risky relationship (Jewkes *et al.*, 2003). Social acceptance of the ‘sugar daddy’ phenomena and older men seeking relationships with younger girls, due to fear of getting HIV/AIDS, has been identified as a unique feature of the high rates of HIV infection in Africa (Leclerc–Madlala, 2002).

In a study among teenage girls in the Eastern Cape, having a male partner five years older than themselves or more was associated with a higher risk of being HIV positive. Further the likelihood of women being able to suggest condom use in these relationships was lower (Jewkes *et al.*, 2003). For young women, sexuality was conceptualized as a resource that can be drawn upon for material and economic advantage (Leclerc–Madlala, 2002; Jewkes *et al.*, 2003). For example sex can be exchanged for a job or acquiring material benefits from men, especially older more experienced men (Leclerc–Madlala, 2002). The scale of benefits ranged from basic needs like food, to the use of sex for fashion accessories, dining in restaurants or driving in

luxury cars (Leclerc–Madlala, 2002). Therefore South African learners have developed a sexual culture which associates sex with gifts, and manliness with the ability to attract many partners (Leclerc–Madlala, 2002). ‘Survival sex’ which is sex for financial gains or for comfort has been also been documented among adolescents in Russia, Georgia and the Ukraine (Goodwin *et al.*, 2004). Therefore these relationships that are associated with monetary rewards increased unsafe sexual behaviours and the subsequent risk of HIV infection together with reducing negotiating power with regard to condom use and coercive sex (Luke, 2003).

It is theorized that violence, substance abuse, delinquency and risky sexual activity reflects an underlying ‘problem behaviour’ construct, which should not be separated (Flay *et al.*, 2004). Engaging in risky behaviours such as drug use and unprotected sexual intercourse often represents adolescents’ acts of rebellion in proclaiming their autonomy, therefore putting them at risk for acquiring HIV infection. Alcohol use and substance abuse are further linked to diminished rational capacity and increased HIV risk (Shisana *et al.*, 2005b). African American adolescents, who used substances reported an increased likelihood to engage in sexual behaviours (Bachanas *et al.*, 2002). Similarly in South Africa, the YRBS reported gender and race differences in alcohol use at last sex. More males (56.1%) than females (43.4%) had ever used alcohol at last sex. Further, more Whites (86.0%) and Coloured learners (66.0%), had ever used alcohol when compared to Black (52.0%) and Indian (39.7%) learners (Reddy *et al.*, 2003). KwaZulu–Natal learners reported the highest prevalence (15.2%), of using alcohol or drugs before sex (Reddy *et al.*, 2003). Similarly, among Zambian learners, drinking alcohol, smoking cigarettes and drug use, was most prevalent in males and increased with age (Magnani *et al.*,

2002). In line with previous research in the United States (Barrera *et al.*, 1999; Brook *et al.*, 1999) the findings among urban adolescents in Durban and Cape Town indicate that personal attributes, peer influence, parental drug use and environmental stressors contribute to substance use (Morejele and Brook, 2006).

The relationship between violence, sexual victimization (unwanted contact, verbal coercion and/or rape/attempted rape) and alcohol/drug abuse, has been well documented (Champion *et al.*, 2004; Rickett *et al.*, 2004). Exposure to violence and substance use, for example having a fight, were also factors related to sexual victimization (Champion *et al.*, 2004). Further, about 50% of all sexual victimizations involved the use of alcohol and/or drugs by the perpetrator, victim or both, in the United States (Champion *et al.*, 2004). Among white college women in the United States, the use of alcohol within the dating relationship, limited the ability of the victim to ward off a potential attack as friendly nonsexual cues were misinterpreted as sexual invitations (Rickett *et al.*, 2004). In addition, *forced sex* was associated with age at first drink, sex without birth control, drug use (in the past month) and having a fight (Champion *et al.*, 2004). Females, who had had their first drink of alcohol between 16-20 years, were five times as likely to be the victim of forced sex compared to those who had never had alcohol (Champion *et al.*, 2004). For females, whose first drink was at 12 years and younger, the risk of forced sex was eight times greater than those who never drank (Champion *et al.*, 2004). Therefore there was a strong association between alcohol use and sexual victimization among adolescent females and the early initiation of alcohol use increased the risk of forced sex (Champion *et al.*, 2004).

In South Africa, 9.8% of learners reported that they had been forced to have sex, more so among females than males; and 8.3% reported that they had forced someone to have sex (Reddy *et al.*, 2003). The use of alcohol with regard to forced sex has to be explored further in South Africa, because there is a strong indication that among other factors, the high incidence of sexual victimization may be associated with the use of alcohol and drugs among learners. Forced sexual initiation was reported to be a very important factor in teenage pregnancy risk among South African learners, as very high levels of physical abuse (60%) were reported in a cross sectional study (Jewkes *et al.*, 2003).

In New York, risk factors for sexual victimization extend beyond alcohol and drug abuse to include having a history of sexual victimization, early age of the first date, the number of dating and sexual partners, the history of dating violence and having a sexually active peer group (Rickett *et al.*, 2004). Forced sex has been reported to occur later in the dating relationship than earlier, among young, ethnically diverse, urban women in New York (Rickett *et al.*, 2004), 35% of who experienced sexual victimization between the ages of 14 and 19 years and 28% were between the ages of 20 and 23 years. Sexual victimization was associated with rape/attempted rape (45%) ($P < 0.001$) and verbal sexual coercion (49%) ($P < 0.05$), which was statistically significantly associated with going to the date's house to be alone (Rickett *et al.*, 2004). Further, among these young women who reported being raped/attempted rape, there was a statistically significant association with a history of hard liquor (71%), marijuana (45%) and other illicit drugs (9%) when compared with those who did not report an unwanted sexual experience ($P < 0.02$) (Rickett *et al.*, 2004).

Among 269 705 South African learners in rural and urban schools (mean age 14.8), overall 8.6% reported that they had been forced to have sex in the past year, more so among younger males than younger females. In the older age group more females than males reported being forced to have sex in the last year (Andersson *et al.*, 2004). Misconceptions about sexual violence and the risk of HIV infection were prevalent among both sexes (Andersson *et al.*, 2004). Among sexually abused learners they were more likely to believe they were HIV positive, have no intention of taking a HIV test, to not inform families if they were HIV positive, to believe that having sex with a virgin can cure AIDS and to intentionally spread HIV (Andersson *et al.*, 2004). Further, around 11% of males and 4% of females claimed to have forced someone else to have sex, while 66% of these males and 71% of these females had themselves been forced to have sex (Andersson *et al.*, 2004).

Sexual coercion among learners and misconceptions therefore contribute to a culture of sexual violence among both sexes in South Africa (Andersson *et al.*, 2004). A history of forced sex also distorts perceptions about sexual violence and the risk of HIV, among learners in schools (Jewkes *et al.*, 2003; Andersson *et al.*, 2004). The false belief systems in South Africa, that having sex with a virgin will 'cleanse' their blood of HIV and cure AIDS (Leclerc–Madlala, 2002; Jewkes *et al.*, 2003) exacerbates rape in South Africa. In a study among learners in South Africa, 40 to 47% of sexual assaults were perpetrated against girls aged 15 or younger (Gachuhi, 1999). A further 30% of girls reported that their first sexual encounter was forced (Gachuhi, 1999). Young people therefore need to learn how to analyze situations, understand what risky behaviour entails and how to manage or avoid risky situations (Gachuhi, 1999).

The age of consent for sexual activity stipulates that any male or female person who has or attempts to have unlawful carnal intercourse with a female or male under the age of 16 years is guilty of an offence (South African Government, 2003). Rape is a Common Law offence in South Africa under the age of 12 years (South African Government, 2003). Yet repeated episodes of sexual violence, early sexual initiation and child sexual abuse have been associated with drug and alcohol use, multiple sexual partners, trading sex for money and drugs and less contraceptive use (Jewkes *et al.*, 2003). Violence in relationships therefore perpetuates the risk of HIV infection among South African learners.

Levels of pregnancy are very high among teenage and young adult women in South Africa in spite of a low overall fertility rate (total number of births per woman) (Harrison, 2005). In many cases adolescent women do not experience the benefit of contraceptives until the birth of their first child (Harrison, 2005) and therefore are exposed to unprotective sex. However, findings from qualitative research suggests that prevention of early adolescent motherhood may require more than the availability of family planning services and low-cost safe abortion, but also a focus on psychological concerns, like the need for sexual intimacy and motherhood as a means of meeting conflicting needs for autonomy and attachment (Stewart *et al.*, 1999). The YRBS, reported that in South Africa, nationally 16.4% of learners have either been pregnant or made someone pregnant. A smaller percentage of Whites (8.5%) than Blacks (17.0%) reported that they had been pregnant or made someone pregnant. A higher percentage of Grade 8 learners (26.4%) compared to Grade 9 (13.3%), Grade 10 (12.6%) and Grade 11 (13.3%) learners, had been pregnant or made someone pregnant (Reddy *et al.*, 2003). The delay of initiation of sexual

intercourse and improved contraceptive practice, contributed equally to declines in pregnancy rates among high school learners in the United States (Santelli *et al.*, 2004a). The authors speculate about the increase in contraceptive efficacy, decrease in the withdrawal method and increase in condom use, together with the combined use of hormonal methods and condom use; however the reasons for these declines were not readily apparent in the study (Santelli *et al.*, 2004a).

2.2.1 Summary of Sexual Risk Behaviours

In transforming the social and economic environment of South Africa with the changing household structures, increased female migration, greater educational and employment opportunities for black women, high unemployment, rising living costs, together with a socio-political environment that advocates contraceptive use; the role of gender in sexual risk behaviour is an important determinant of adolescent sexuality (Varga, 2003). Gender roles are imbedded in the cultural context and increase vulnerability of adolescents to sexual risk behaviour. Therefore addressing gender cultural norms should be the first step towards safer sex practices among learners.

The age of sexual initiation is reported to be dependent on a number of demographic factors together with race, poverty, family structure, school underachievement and school environment. Among teens, early sexual initiation increases exposure to HIV infection and unplanned pregnancies. Sexual initiation ranged from 14 to 17 years of age among learners in South Africa and this early age implies multiple partnerships until adulthood, which is associated with greater

sexual risk in later life (Harrison, 2005). Addressing abstinence behaviours and fidelity therefore deserves high priority among learners in South Africa.

Age mixing for economic gain, in sexual relationships among learners also increases their risk for HIV infection. The choice of older partners that are more financially independent has ripple effects and seems to fuel the HIV epidemic in South Africa, especially among women where gender stereotypic norms persist. Increasing AIDS knowledge and self-efficacy interms of decision making with regard to relationships with older men is a gap in research that needs to be addressed.

Experiences with drugs and alcohol have been linked to violence and abuse in relationships that perpetrate the spread of HIV/AIDS among learners. Young people therefore need to learn how to analyze situations, understand what risky behaviour entails and how to manage or avoid risky situations (Gachuhi, 1999), However many young people are not developmentally mature enough to do this. Many reports of early sexual initiation may therefore be linked to incidences of coercive sex. Further pregnancy among learners seems to be related to early sexual initiation and inadequate or no contraceptive use. Both factors place young people and their babies at risk for HIV infection. Experimenting with drugs and alcohol are not uncommon among young people however increasing knowledge of the link between coercive sex and substance use together with refusal skills is essential in AIDS interventions.

From the overview of risky sexual behaviours it has been conceptualized that these behaviours do not occur in isolation but overlap into each other. This conceptualization is supported by Coombe (2000) who reported that sexual risk behaviours do not operate in isolation but are part of a larger system that interacts with each other. Therefore, initiating any risky behaviour may lead to progression into other risky behaviours. Therefore breaking this cycle of behaviours will generate better sexual health outcomes. The following diagram illustrates the ripple effects of sexual risk behaviour. Cohen *et al.*, (2002) further outlines that high risk sexual behaviours often cluster together, with early sexual behaviour being associated with more lifetime sexual partners and higher rates of STIs, substance use and delinquency.

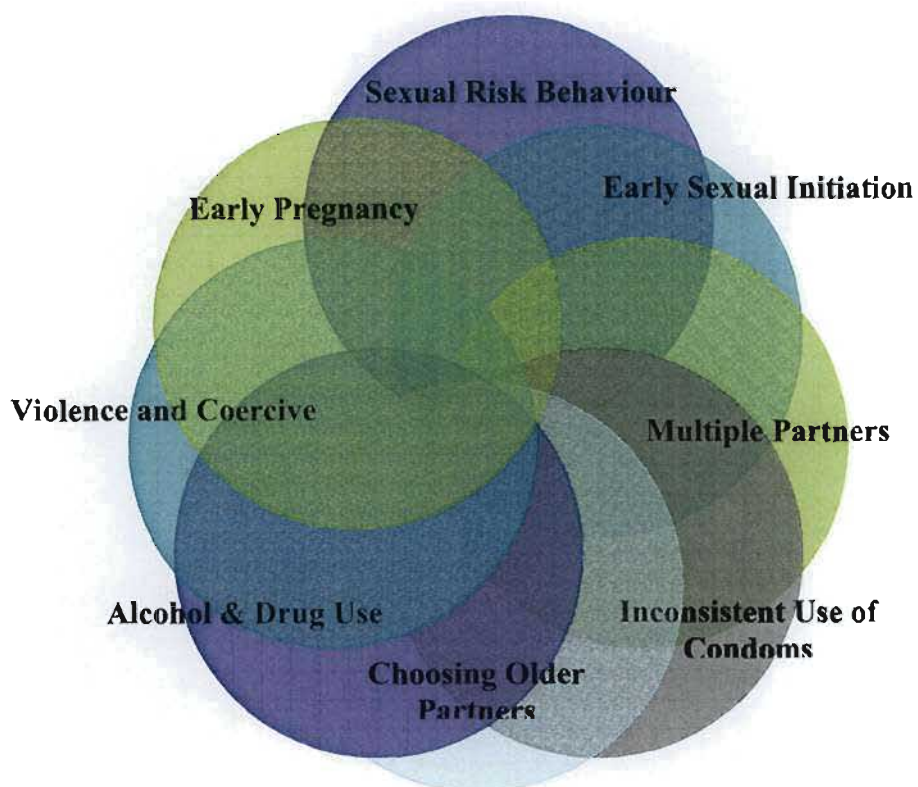


Figure 5. The Ripple Effects of Sexual Risk Behaviour (S.Frank, 2005)

High-risk sexual behaviour should therefore be conceptualized as an environmental, social and cultural problem that often disempowers learners from transforming safe-sex knowledge into functional, health-promoting, safer-sex behaviour (Leclerc-Madlala, 2002). The following review explores some of these contextual factors further.

2.3 Demographics and Determinants of Sexual Behaviour:

Mediating Factors

2.3.1 Demographic Factors

The importance of contextual factors on adolescent behaviour in South Africa has been well documented (Varga, 1997; Leclerc–Madlala, 2002). The country’s history of social inequality manifested in geographical differentials, persisting from the apartheid era of racial boundaries, has patterned the spread of the disease and underpinned the perceptions and prejudices in the prevention and intervention of the diseased (Gilbert and Walker, 2002). For many adolescents, a history of political strife and economic hardship may produce behaviour that manifests in boredom, disengagement and risk–taking (Roos *et al.*, 1995). Adolescents that were most likely to take sexual risks live in communities that endured high levels of crime, high residential turnover, extreme rates of poverty, elevated unemployment rates and low educational levels (Kirby, 1999). Teenagers have the greatest opportunity to engage in risky behaviour during periods that are unstructured and unsupervised (Larson and Verman, 1999) (Kaufman *et al.*, 2002). Adolescents who spent time after school with peers and without adult supervision reported higher levels of risky behaviour compared to those who were supervised by parents (Huebner and Howell, 2003). The parenting process was further influenced by contextual factors and cultural values, access to resources and education, socio–economic status and neighbourhood safety (Huebner and Howell, 2003). Similarly learners in California, who were unsupervised for thirty or more hours per week, were more likely to be sexually active compared to those who were unsupervised for five hours a week or less (Cohen *et al.*, 2002). These researchers also found that for boys, the greater the amount of unsupervised

time, the higher the number of lifetime sex partners, while for girls who did not participate in after school activities, 71% were sexually active compared to 59% of those who were participating (Cohen *et al.*, 2002). Alcohol and tobacco use was also associated with unsupervised time for boys but not for girls, and boys who were unsupervised for more than five hours per week were twice as likely to have an STI, like gonorrhoea, compared to boys who were unsupervised for less than five hours per week (Cohen *et al.*, 2002).

Among South African learners in Durban Metro and Mtunzini, KwaZulu–Natal, the number of hours spent hanging out was positively associated with having had sex in the last year and negatively associated with condom use, irrespective of race (Kaufman *et al.*, 2002). White girls however were about three times more likely than Indian girls to have had sex in the last twelve months. The odds of girls having sex were found to increase with age (Kaufman *et al.*, 2002). Further, African urban girls were twice as likely to have sex as white girls. Those who lived in communities where participation in sports was high were one–fifth as likely to have had sex in the past year as those who lived in communities where participation in sports was low (Kaufman *et al.*, 2002). Girls living in areas with a high level of opportunity for educational attainment tended not to report having had sex recently, whereas no detectable effects of this behaviour were found for boys. However, boys from households with a better educated adult were more likely to report condom use. Therefore formal education has not yet produced an environment where both girls and boys elect to use condoms. Gender was reported to be more important than race in predicting sexual risk–taking among young people (Kaufman *et al.*, 2002).

A number of contextual factors have been described in the review of demographic factors and sexual behaviour. Of relevance to South African learners is that despite living in post apartheid South Africa, stereotypes of each race still persist and need to be changed. Collectively negative contextual factors are harmful in terms of intervention programme designs which are in keeping with social learning theories. The context in which adolescents face and make sexual decisions is therefore a critical consideration in high HIV/AIDS prevalence settings like South Africa (Kaufman *et al.*, 2002).

2.3.2 Determinants of Sexual Behaviour

Research has shown that education about sexual health does not promote early sexual activity or promiscuity, but rather delays the initiation of sex and encourages safer sex behaviours, like condom use (May *et al.*, 2001). In support of the benefits of reproductive health knowledge informational presentations were reported to be useful, although they were clearly not as beneficial as more sustained and intensive skills training approaches (St. Lawrence *et al.*, 1995). Educating adolescents about HIV/AIDS statistics, modes of transmission and prevention strategies has however been ineffective for those currently infected with HIV, who reported that they were twice as likely as adults to engage in risky behaviours, despite their HIV status (Diamond and Buskin, 2000). Therefore knowing the facts was not enough because people reported that hedonistic beliefs took precedence over safe sex options (Jemmott *et al.*, 1992b). Learners therefore need to learn how to translate increased knowledge and understanding about HIV transmission into safe-sex practices (Taylor *et al.*, 2000). In a study among learners in rural KwaZulu-Natal, most learners knew about HIV/AIDS but had not

related it to their own lives and practices (Taylor *et al.*, 2000). In addition Botswana learners between the ages of 12 and 18 years were very knowledgeable about precautions against HIV/AIDS but this awareness did not translate into change in sexual behaviour (Osei-Hwedie and Namutosi, 2004). Similar findings were reported among rural learners in KwaZulu-Natal (James *et al.*, 2004). Although knowledge alone was insufficient to change behaviour, an increased understanding of HIV/AIDS may be a necessary pre-requisite to change behaviours that put one at risk of HIV transmission (Pearlman *et al.*, 2002). Teaching medically correct information alone, about human reproduction, HIV/AIDS and STIs, and methods of prevention, among Zimbabwean girls, had to be accompanied by skills training in negotiation, handling pressures, refusal and assertiveness (Betts *et al.*, 2003). Adolescents may not have reached sexual maturity and may not have developed sufficiently intellectually to be able to change behaviour on the basis of facts (Odutolu, 2005). Thus interventions which rely on information alone may be ineffective. Further many youth in Africa are reported to be out of school and such knowledge building exercises may be out of their scope (Odutolu, 2005).

Attitudes towards behaviour is seen as reflecting an individual's beliefs about performing the behaviour in question and the positive or negative consequences associated with engaging in the behaviour (Villarruel *et al.*, 2004). Certain gender norms and deeply held beliefs on sexuality indicate that many learners are having sex within a context that regards men as sexually driven and women as largely passive victims of male desire (Campbell, 2003). This role stereotyping is detrimental to safe sex practices. Norms of masculinity may be encouraging risk-taking behaviour, leading young men to believe that they should be

knowledgeable and experienced in all matters of sex, and preventing them from seeking information on safe sex practices from clinics and hospitals (Heywood, 2004). However, certain cautionary behaviours may interfere with beliefs and prevent a positive outcome. For example, if learners believed that condom use prevented sexual enjoyment and reduced physical sensation they would be less likely to use condoms (Heywood, 2004). Among Latino adolescents, the belief that their parents had high expectations of them and a belief in the importance of a good education were positively associated with abstinence or delays in sexual intercourse (Villarruel *et al.*, 2004). The determining factor is whether individuals believe their partners would react favourably to their efforts to use condoms. Hedonistic beliefs (Jemmott *et al.*, 1992b) and partner reactions have been predictive of condom use among Latinos (Villarruel *et al.*, 2004).

Subjective norms reflect normative beliefs concerning significant referents, and their approval or disapproval of particular behaviours (Villarruel *et al.*, 2004). For adolescents, if significant others such as one's partner, parents or peers disapprove of their sexual behaviour, they may be less likely to engage in the behaviour than if others approved (Villarruel *et al.*, 2004). Many South African adolescents experience poor communication with parents about sexual matters which in turn may contribute to unsafe sexual behaviours (Eaton *et al.*, 2003). In a study of Latino college learners in the United States (Jemmott *et al.*, 2002) normative beliefs were positive predictors of condom use intentions rather than behavioural beliefs (Villarruel *et al.*, 2004). This suggests that perceptions of normative support were stronger determinants of their intentions to use condoms than behavioural beliefs about the consequences of condom use (Villarruel *et al.*, 2004).

In the African context researchers have outlined the integral role of social norms in sexual decision-making (Odotolu, 2005). The social context creates meaning and norms for sexual behaviours. Societal pressure or peer acceptance is a motivating factor for behaviour. Social networks are traditional institutions where social learning occurs and influence is exercised. In Africa, these social networks could be among age grades, gender, religious groups, ethnic affiliations, and social groups. Members comply with the normative expectations of these groups and as group norms change individual behaviour is modified based on social influences (Odotolu, 2005). Positive and preventative risky behaviours can therefore be shaped and changed into new behaviours. The positive interaction between the existing sexual norms and HIV prevention interventions, in the Senegal study suggested that identifying and promoting protective social norms could be effective in other countries as well (Merson *et al.*, 2000).

AIDS risk reduction behaviour is further influenced by self-efficacy, i.e. the perception that a person has sufficient resources and skills to perform behaviour and the confidence to do so adequately (Bandura, 1982; Jemmott *et al.*, 1992b). Bandura's definition of perceived self-efficacy refers to one's judgment of, rather than actual, skills with regard to one's ability to perform a specific behaviour (Bandura, 1982). In addition to learners not perceiving themselves to be at risk for HIV infection (Facente, 2001; Bettinger *et al.*, 2004), they also lacked the confidence to abstain in the context of peer relationships and gender role expectations. Self-efficacy was reported to be an important determinant of AIDS risk reduction among adolescent women that were taught condom use skills (Jemmott *et al.*, 1992b). Perceived self-efficacy regarding their ability to implement condom use had a more

positive impact on the women's confidence than AIDS knowledge alone (Jemmott *et al.*, 1992b). Further among Grade 12 learners in rural high schools in South Africa, females had higher self-efficacy than males with regard to carrying a condom, discussing condom usage, were not afraid of rejection when suggesting condom use and could easily convince their partner to use condoms. Males reported having higher self-efficacy than females in putting on a condom, using condoms by themselves quickly and using condoms after drinking (Peltzer, 2000).

With regard to low self-efficacy there was a need to focus on interpersonal skills in discussing condom use with a partner, physically handling a condom, talking through the embarrassment of using a condom and building assertiveness skills (Peltzer, 2000). Research studies have also pointed to the links between low self-efficacy and smoking, alcohol and drug abuse, anorexia and bulimia, risk-taking behaviour and cognitive performance (WHO, 1996). High self-efficacy has also been found to be associated with improvements in academic and cognitive performance in Sri Lanka. In a study among 10th Graders in thirty seven schools, researchers found a relationship between a sense of competence and school achievement (Niles, 1986).

Behavioural intentions are also reported as a major determinant of behaviour choices (Ajzen, 1985). Behavioural intentions in turn are determined by attitudes towards the behaviour, subjective norms regarding it, and perceived control over it. Among Latino adolescents,

attitudes, subjective norms, behavioural beliefs, normative beliefs and self-efficacy were predictive of behavioural intentions (Villarruel *et al.*, 2004). Participants, who believed that their parents were more likely to feel proud of them or that career goals would be compromised, were more likely not to have sex (Villarruel *et al.*, 2004). While learners who had a positive attitude regarding sexual intercourse and who perceived greater partner approval for having sex, reported stronger intentions to have sex and were more likely to report having sex in the preceding three months (Villarruel *et al.*, 2004).

2.3.3 Summary of Demographics and Determinants of Sexual Behaviour

The context in which learners live therefore plays an integral role in whether or not they engage in sexual risk behaviour. Parental supervision, crime, poverty and race were key factors that need consideration in programme planning and design, as these factors interact with determinants of sexual behaviour to produce behaviour outcomes. In addition, the interplay between knowledge, attitudes, behavioural beliefs, subjective norms and self-efficacy indicates the direction of intentions to practice safer sex and change behaviours positively. The reported high levels of knowledge among South African learners, has done little to impact a decline of the AIDS epidemic (Harrison, 2005). Greater emphasis should therefore be placed on improving contextual factors together with influencing protective attitudes, beliefs, subjective norms and self-efficacy, so that intentions to change behaviours produce rapid declines in AIDS incidence and prevalence.

2.4 The Culture of Learning in South Africa and Policies that Guide Learning

Global priorities to fight the HIV/AIDS epidemic have targeted a range of prevention programmes to ensure at least 90% of young people (15-24 years) have access to information, education and services necessary to develop Life Skills', and reduce by 25% the rate of HIV infection amongst learners (UNAIDS, 2006). While some successes have been noted in the Life Skills' programme for those at school, these efforts have not been sufficient to have any impact in curbing the spread of HIV infection among learners (Abdool Karim and Abdool Karim, 2005).

The culture of learning in South Africa also poses a hindrance to prevention efforts. A high quality education needs to be in place for all South Africans and this can be achieved by alleviating poverty, addressing HIV/AIDS issues in schools, preventing all forms of violence in schools, combating various forms of substance abuse and providing access to education for learners who are currently out of school (Coombe, 2000). Policies therefore need to be adapted to address the environmental and pragmatic issues relevant to learners in this country. The National Youth Policy, has identified eight priority target groups, including young men and women at risk through socio-economic factors or participation in risk behaviours and those with HIV/AIDS (Department of Health, 2001b). The policy guidelines for Adolescent and Youth Health (2001) are in agreement with the National Youth Policy and have identified the development of a South African Youth AIDS Programme, together with a youth law team which is tasked to review laws bearing on youth health (Department of Health, 2001a). The

education system in South Africa is facing one of the most challenging eras in history. In addition to changes in infrastructure of the Education Department, KwaZulu–Natal has seen five ministers of education in the past nine years and innumerable adjustments to staffing and management structures (Department of Education, 2004). Political interference in education is however to the detriment of the learners. Continuous policy changes, reduction of the number of teachers in schools and an increase in the teacher–learner ratio (1: 35-40-45-50) is detrimental to the education system in South Africa (Department of Education, 2004).

The climate in South Africa in this era of HIV/AIDS includes large populations of poverty stricken families, increases in deaths of breadwinners and care–takers, increases in child–headed households and vulnerability to abuse among learners (Coombe, 2000). Traditional teaching alone can no longer be implemented but must be seen in the context of the environment of the learner. There are also records of the high incidences of HIV infection among teachers themselves (Rehle *et al.*, 2005; Shisana *et al.*, 2005a;). Death or absence of teachers, including experienced teachers, has an impact on the quality and efficiency of education in general. The prevalence of HIV among South African teachers is reported as 12.7% compared to 14.7% among other professionals in the public health sector (Shisana *et al.*, 2005a).

The importance of focusing on young people was recognized at a global level by the 2001 UN General Assembly Special Session on HIV/AIDS (UNAIDS, 2006). The General Assembly

endorsed that by '2005, at least 90% and by 2010, 95% of young people should have access to education and information to develop Life Skills', in full partnership with learners, parents, families, teachers and health care providers'. This would reduce their vulnerability to HIV infection, (Department of Education, 2004). In view of this the Department of Education has recognized HIV/AIDS as one of its top priorities; however, the full integration of HIV/AIDS into all levels of education involves capacity development and resources. The introduction of Tirisano (working together) outlined the implementation plan of the Department of Education (2000-2004) (Department of Education, 2004). The Minister of Education, in 2000, called for transformation of the education system from one of segregation and disparity to one of equal opportunity for all South Africans (Bhana, 2004). The plan targets the educational and health needs of learners with regard to HIV/AIDS, substance abuse, gender and sexuality (Bhana, 2004). With regard to HIV/AIDS the priority areas included; awareness, information and advocacy, including HIV/AIDS in the school curriculum and developing models to understand the impact of HIV/AIDS on the education system.

The constitution of the Republic of South Africa provides teachers with a foundation for curriculum transformation in this country (South African Government, 1996a). In the past South Africa was separated by race, class, gender and ethnic division. This separation had a direct impact on education. To normalize the situation in education the traditional methods of teaching were replaced by an outcome based education approach (OBE) to teaching (Spady, 1994). The education White paper 6 (2001) was compiled, based on a need for change in the education system (Department of Education, 2001). It realized that education and training needed to be responsive and sensitive to the diverse range of learning needs. Emphasis is

placed on the necessity to move away from the traditional aims and objectives approach to the outcomes based education approach.

OBE as stipulated in the National Curriculum 2005 is a developmental approach which focuses on what learners learn and are able to do at the end of a learning process. It is an activity based approach to education designed to promote problem-solving and critical thinking (Department of Education, 2001). OBE is guided by four principles, namely 1) clarity of focus maintaining a clear focus of outcomes and performance demonstration, 2) lesson plans and assessments evolve around the expected performance, 3) the pictures of the desired outcomes is the starting point for curriculum, instruction, assessment, planning and implementation, which must be aligned with the expected outcome, 4) there are no surprises because the teacher explains and models the outcome from the first day. The learners and teachers work together towards an explicit common goal (Spady, 1994). When the four principles work together they complement each other, enabling teaching and learning to be successful. OBE can be continuously refined and revolutionized, consistently, systematically, creatively and simultaneously (Spady, 1994).

2.4.1 Life Skills' Education

The Life Skills'' programme remains the key strategy in education to address HIV/AIDS (Department of Education, 2003b). Life Orientation (LO) is the study of the self in relation to others and to society, with special emphasis on the development of balanced and confident learners who will contribute to a just and democratic society, a productive economy and an improved quality of life for all (Department of Education, 2003b). Curriculum 2005 has Life Orientation as one of the eight learning areas (Department of Education, 2003b). The four focus areas of LO include personal well being, citizenship education, recreation and physical activity and careers and career choices (Department of Education, 2003b). HIV/AIDS is integrated into all focus areas, however it is specific to the focus area of personal well being (Department of Education, 2003b). Personal well being incorporates areas of self-concept, emotional literacy, social competency and Life Skills'; dealing with the realities of peer pressure, being a leader and a follower, being a parent, prevention of substance abuse, sexuality, teenage pregnancy, and STIs, HIV/AIDS. The emphasis is on building self-esteem and confidence. The role of environmental influences on behaviour is also included, for example, indigenous knowledge systems, religion, concepts of power relations and gender relationships (Department of Education, 2003b).

Life Skills'' education covers the skills and competencies that an individual needs for sustaining and enriching life and also the kind of behaviour-based learning that the individual needs for coping with predictable developmental tasks (Bender and Lombard, 2004). Life Skills' are therefore indispensable to the process of empowering individuals to engage in and

cope successfully with life and its challenges, especially in a developing society like South Africa (Bender and Lombard, 2004). The psychosocial factors that contribute to health and social problems include stress, poor coping skills, low self-esteem and low self-efficacy (WHO, 1996). Education in this area involves a dynamic process of teaching and learning, modelling of skills and the practice of skills (WHO, 1996). As such Life Skills' that focus on information giving sessions alone are futile.

In Peru, although sex education was formally included in the curriculum, it was rarely addressed adequately, because government departments had failed to create the infrastructure capable of operationalizing the programme, including educational materials, additional training for teachers and teaching methodologies (Caceres *et al.*, 1994). Further teachers themselves were reluctant to present material on sex education because of their own perceived self-limitations. This may also be the case of the education system in South Africa, where the implementation of the Life Skills'' curricula varies from province to province and has been reported a being inefficient (Coombe, 2000). Large numbers of learners need to be reached in South Africa, teaching material needs to be adjusted, master teachers need upgrading and the models of peer group support need to be elaborated (Department of Health, 2000b). Further the content of Life Skills' requires more robust evidence on violence against women and children, bisexuality, an understanding of the impact of customs, poverty, family disorientation, gender inequalities and AIDS myths as factors that perpetrate the spread of disease (Coombe, 2000).

The University of Cape Town, School of Public Health, challenged teachers in Mitchell's Plain, on their own knowledge and attitudes towards gender and sexual violence, with a view to include these items in the primary school curriculum (IRIN News, 2003). The project used HIV/AIDS education as an entry point for looking at sexual violence, because gender inequality played a major role in sexual violence. Teachers responded to questions about their own experiences of violence. Among women teachers, almost half reported experiencing physical abuse at the hands of an intimate partner while 31% reported experiencing sexual abuse. Among the male teachers, a quarter reported that they had been physically abusive and 12% said they had been sexually abusive (IRIN News, 2003). These findings have important implications for Life Skills' education. Teachers are supposed to be change agents, but they could be perpetrators of the very acts that the Life Skills'' curriculum addresses, and hence the role of teachers as perpetrators of abuse would continue to be an obstacle in Life Orientation programmes (IRIN News, 2003).

Data from the Department of Education indicated that internal conflicts in schools were also a major problem which prevented effective teaching and learning from taking place (Perlman *et al.*, 1997). In changing the culture of learning and teaching in schools, a change in the way schools operate, restoring law and order in schools and relationships between staff, should receive priority (Perlman *et al.*, 1997). Post apartheid South Africa is a country undergoing major transitions, which impacts directly on the lives of the learners. Compulsory schooling for learners offers them opportunities to acquire knowledge and skills that should equip them to make informed decisions (Bradshaw *et al.*, 2004) however the inconsistencies in teacher

training together with large teacher–learners ratios are among the many obstacles that hinder the Life Skills’ programme in schools.

Environmental factors have led to the launch of the campaign for Culture of Learning and Teaching (COLTS) by government in 1997, to create school–based programmes to aid in transforming South African schools from sites of struggle to places of learning, teaching and service (Biersteker, 2000). Besides problems of low enrolment and attendance in educational systems in Africa, one of the biggest concerns is the inability to retain students until they complete primary or high school (Sibanda, 1996). The problem of school drop-outs reflects the inadequacies in schooling systems which is compounded by persistent poverty among certain segments of society (Sibanda, 1996).

South Africa has a high school drop-out rate with only 40% of students who enrolled in Grade 1 matriculating in Grade 12 (Department of Education, 2003a). In a study among learners in Cape Town, South Africa, those learners who experienced sexual intercourse or who engaged in unsafe sexual behaviour were more likely to drop-out of school before Grade 12 compared to their counterparts that remained in school (Flisher *et al.*, 2005). This suggests that experience in sexual intercourse and engaging in sexual behaviour is predictive of drop-out rate among high school learners in Cape Town (Flisher *et al.*, 2005). However, the South African Schools Act states that it is compulsory for learners to attend schools from the age of seven until the last school day of the year in which the learner reaches the age of fifteen years

or the ninth Grade (South African Government, 1996b). Therefore after Grade 9 it is not compulsory for learners to attend school.

The 1996 census reported that various household- and individual- level characteristics were found to be important determinants of dropping out of school in South Africa (eThekweni Municipality, 2004). The household size, female headship and the standard of living were found to be strong predictors of drop-out rates among African and Coloured learners. Race, gender and disability, also affected the likelihood of dropping out of school. The effects of gender show that African and Coloured girls were more likely to drop-out of high school than boys. Among Asians and Whites the gender differences were not significant. The higher odds of dropping out among African and Coloured female high school learners could be linked to early family formation (Sibanda and Zuberi, 1999). The effects of the relationship to the head of the household indicated that children were significantly less likely to drop-out of school among African and Coloured. The selection process for remaining in school appears to favor students from wealthier households (Sibanda and Zuberi, 1999).

The culture of learning and teaching in schools (COLTS), 'No Crime in Schools' component aims to counter the undermining effects of hostile school environments to learning through school safety, violence prevention and victim empowerment through Life Skills' curriculum (Biersteker, 2000). There are many schools where COLTS encompasses violence including rape and sexual harassment. Childline, an NGO assisting victims of child abuse have estimated that one in three South African girls under the age of sixteen are abused, often in

schools (Human Rights Watch, 2001). The culture of learning in many South African schools is therefore one of inadequate facilities, redeployment of teachers, problems relating to motivation of learners, literacy, HIV/AIDS, gangsterism, corporal punishment, drug abuse, crime and corruption (Smith, 2000). Problems in schools cannot be reduced to a single cause or solution. The collapse in the culture of learning in South African schools has been perceived as due to deficiencies in the infrastructure and resources, leadership and management, teacher absenteeism and in discipline of learners (Pearlman *et al.*, 2002). The socio economic context, high unemployment rate and rivalry over scarce resources in surrounding communities have also contributed to theft and vandalism of school property, drug trafficking, violence against women and conflict between migrant and urban workers (Pearlman *et al.*, 2002). In a Soweto school in South Africa, Maja (1994) reported on factors that contributed to the breakdown of learning and teaching in the school. These factors included vandalism, high school drop-out, failure rate, lack of punctuality among learners, poor school resources, drugs, rape, hijacking of teacher's cars, theft and shooting in schools and the low morale of teachers. The culture of learning at this school therefore needed to incorporate discipline, effective school governance, parent involvement and improved teaching practices. Learners were further demotivated and educational authorities needed to be engaged in changing these counter productive patterns of behaviour (Maja, 1994).

If we are to have a positive culture of learning and teaching in schools, the learning environment must be safe, orderly and conducive to learning. Extensive research shows that corporal punishment does not promote a culture of learning and discipline in the classroom and in fact contributed to truancy and high drop-out rates in South African schools. According

to the South African Schools Act, the main focus of the code of conduct should be positive discipline and constructive learning (South African Government, 1996b). The focus on the social and psychological causes of difficult behaviour provides important practical solutions to a wide range of discipline problems. Further, the level of internalized rage and trauma needs to change together with moving people above the poverty line, if the culture of learning is to change (Dalamba, 1999). Issues of culture, tradition, behaviour, self-esteem and changing gender roles need to become a national priority for change to occur (Dalamba, 1999).

2.5 Youth HIV/AIDS Preventative Strategies and Interventions

2.5.1 Condom Promotion

Abstinence prior to engagement in mutually faithful monogamous relationships should be promoted as part of any behaviour change prevention strategy. However for those who are unable to or fail to abstain, the male and female condoms are alternative AIDS prevention options (Abdool Karim and Abdool Karim, 2005). One of the keys to effective prevention is therefore the consistent and correct use of condoms. The use of condoms has received a great deal of research and media focus while being faithful in a monogamous sexual relationship, with one uninfected partner for the duration of one's life, is not emphasized. Therefore the Abstain, Be Faithful and Condomise (ABC) campaign characterizes condom use as necessary only when one's partner is unfaithful and strengthens the perception that condom use indicates a lack of trust and infidelity. However even those who are faithful to one partner in perpetuity, usually do not have any knowledge of their partner's HIV status (Heywood, 2004).

Further controversy around condom use arises as most sexually active men and women do not believe that condoms are necessary in a 'steady' relationship (Varga, 1997). The use of condoms is highly stigmatized together with being associated with disease and being unhealthy to use (Walker *et al.*, 2004). Stigmatized beliefs around condom use include 'young women who carry condoms, have loose morals' and 'those who carry condoms will be ridiculed by peers' (Campbell and Mzaidume, 2002). Adolescents also reported that using condoms decreased sensations and resulted in an interruption of the sexual act (Jemmott *et al.*, 1992a; Stewart *et al.*, 1999). In support of these findings, a study among young undergraduate females, in New Jersey, United States, reported that those who believed that sex was fun when a condom was used expressed more favourable attitudes towards condom use and had firmer intentions to use condoms (Jemmott *et al.*, 1999). Two hypotheses regarding condom use among mineworkers can also be applied to learners. The first hypothesis sees 'flesh to flesh' sex as providing an avenue for emotional intimacy, which is more likely when there is no supportive social environment and when loneliness sets in (Campbell, 2003). The second hypothesis regarding the practice of unprotected sex speaks of a 'macho sexuality', where men have a need for multiple sexual partners and a manly desire for the pleasure of 'flesh to flesh'. These gender stereotypes apply to all categories of men, young and old (Campbell, 2003). Therefore emotional intimacy and gender driven belief systems play an important role in condom use.

Belief systems together with positive attitudes were reported to produce higher perceived subjective norms and stronger feelings of self-efficacy to use condoms, when compared with

inconsistent condom users (Campbell, 2003). Further the rated importance or motives for having sexual intercourse is a significant determinant of condom use with a new partner (Cooper *et al.*, 1998; Abraham *et al.*, 1999). In addition, perceived risk of HIV infection could also influence sexual behaviour and condom use (Betts *et al.*, 2003). Youth in South Africa (73%) generally reported that they were at no risk or small risk of HIV infection, and hence they did not feel the need to protect themselves (Bhana, 2004). Contrary to South African learners, 47% of learners in Zambia believed that condoms should be used during all sexual encounters to avoid infection (Magnani *et al.*, 2002). Most respondents were concerned about becoming infected with HIV, although a modest number felt they had not done anything to put themselves at risk of infection (Magnani *et al.*, 2002).

Condom use was also determined by the kind of relationship that existed between partners among 15 to 23 year old adolescents in the Netherlands, i.e. whether it was steady or casual (Gebhardt *et al.*, 2003). In steady relationships a more positive attitude toward the use of condoms was held than in casual relationships (Gebhardt *et al.*, 2003). Safer sex practices were however hindered by the unavailability of condoms, the influence of alcohol and drugs and negligence (Gebhardt *et al.*, 2003). Studies in South Africa, point to ongoing difficulties faced by adolescents in obtaining condoms, as well as negotiating and following through with their use (Abdool Karim *et al.*, 1992a; Abdool Karim *et al.*, 1992b; Abdool Karim *et al.*, 1992c). For South African learners there were strong associations between condoms and notions of unfaithfulness, lack of trust, lack of love, disease and incompatibility with manliness. These beliefs therefore continue to pose barriers against safer sex practices.

2.5.2. Intervention Programmes for Youth

Prevention interventions with regard to sexual behaviour and reproductive health have developed and changed over time. Interventions in Africa have relied upon the assumptions that correct information on transmission and prevention would lead to behavioural change (Hubbard *et al.*, 1998; UNAIDS, 1999a; Fishbein, 2000; Muli, 2000). With the local South African HIV/AIDS statistics continuing to increase beyond expectation, it is important to confront the fact that, for the most part, research agendas and interventions among learners, have done little to affect the course of the epidemic (Leclerc–Madlala, 2002). Within the United States and globally youth interventions have been well documented. However, most tested interventions in other countries focused on single categorical areas, and often did not include the broad range of school health components, for example hospitals, clinics, community resources, etc. (Senderowitz, 1997). For a comprehensive school programme it is important to integrate multiple intervention components (Senderowitz, 1997). The following section will *firstly* examine some of the theory-based interventions that have been conducted among youth around the world, primarily in schools. Theory-based interventions are reported to be effective in promoting long-term behaviour change among youth (Bandura, 1986). The different school-based interventions implemented and the key outcomes for behaviour change are described in (Table 2, p54). *Secondly* interventions implemented outside of the school environment are also explored following school-based interventions. *Thirdly*, the role of mass media interventions in AIDS prevention would be examined briefly.

2.5.2.1 School-Based Interventions

Table 2. Summary of Research of School-Based Learners Reproductive Health Programmes

Reference	Location/Sample of Baseline	Programme Description	Design	Months of Observation	Results: Change in Outcome	Conclusion
A. St. Lawrence <i>et al.</i> , 1995	School-based, learners from 4 youth clubs in United States, n = 105, mean age 16 years	Project B.A.R.T. Educational programme for Control Group (CG) & a sexually explicit 8-week programme & behavioural skills training for Intervention Group (IG)	Pre-test- post-test intervention study, IG & CG, Social Learning Theory & IMB model.	12 months	IG participants < unprotected intercourse, > condom-protected intercourse & > behavioural skills more than the CG. Patterns of change differed by gender. IG maintained risk reduction behaviour for 1 year later.	Learners who were equipped with information & appropriate skills (IG) lowered their risk to a greater degree, maintained risk reduction changes better & deferred the onset of sexual activity to a greater extent than learners in the CG.
B. Hubbard <i>et al.</i> , 1998	School-based, in 5 high school districts in Arkansas, n = 212, Grade 9-12, age not stated	Reducing the Risk 16 session curriculum, teachers implemented the programme	Quasi experimental design , pre-test post-test, IG & CG, Social Cognitive Theory	18 months	Learners receiving the curriculum (IG) significantly delayed initiating sexual intercourse, were > likely to protect themselves from STI/HIV & pregnancy than CG. IG significantly > parent-child communication about sexual issues than CG.	Theory based intervention are effective in influencing the actions of adolescents with regard to sexuality & reproductive health. Positive behavioural effects were reported in IG than CG.
C. Fitzgerald <i>et al.</i> , 1999	School-based, in 10 high schools in 2 districts in Namibia, n = 515, median Grade =11, median age=17 years	My Future my Choice Face to face intervention, focus on abstinence & safer sex	Randomized trial, pre-post intervention study, IG & CG, Social Cognitive Theory & Protective Motivation Theory	1 month & 3 weeks	Knowledge increased significantly among IG compared to CG. > IG than CG believed they could abstain from sex, could be intimate without sex, could explain impregnation, could use a condom & could ask for condoms in a clinic. < IG believes in coercive sex & in condoms reducing pleasure than CG. >IG intended to use condoms & < used alcohol during sex than CG.	Western based HIV prevention programmes can be adapted to African cultural settings. A single intervention is effective in short-term follow up in both genders.

Reference	Location/Sample of Baseline	Programme Description	Design	Months of Observation	Results: Change in Outcome	Conclusion
C. Jemmott <i>et al.</i> , 1999	School-based, in New Jersey, n = 496, mean age = 13 years	Health Promotion Project Comprehensive sexual health programme on transmission of HIV, beliefs, risk reduction methods- interactive model for IG. A general health promotion intervention- for CG	Randomized controlled trial, IG & CG, Social Cognitive Theory	6 months	Adolescents in the IG expressed > favourable behavioural beliefs about condoms, > self-efficacy & stronger condom use intentions post-intervention than in the CG. After 6 months learners reported that they displayed < HIV risk-associated sexual behaviour than the CG.	Cognitive behaviour change interventions can reduce HIV risk associated sexual behaviour.
D. Magnani <i>et al.</i> , 2001	School & health clinic based. 10 clinics paired with 10 schools in Brazil n = 4 800 in school & n = 385 in clinic, 11-19 years of age	Integrated Adolescent Reproductive Health Project Comprehensive sexual & reproductive health curriculum on sex, anatomy, beliefs, myths, STI & pregnancy prevention, contraception etc. Intervention integrated sex education into the regular curriculum	Matched quasi-experimental CG panel design. IG & CG, Not theory based.	30 months	Increase in flow of sexual & reproductive health information to high schools, greater intention to use clinics. No effects on sexual & contraceptive behaviours. Increase in levels of reproductive health knowledge, positive changes in attitudes, perceptions & intentions to practice safe sex in IG than CG.	Low impact on learners' use of clinic services indicates problems in referral systems while failure to indicate behaviour change may be evident once the programme becomes more established.
E. Pearlman <i>et al.</i> , 2002	Community & school-based, in 9 communities in Massachusetts, n = 235 adolescents, 164 peer leaders (mean age= 15.2) & 71 control learners (mean age= 15.6)	Community programme -parenting skills or teen moms. School-based health education: sex education, reproduction, no skills building Intervention: peer leadership AIDS prevention course & ongoing group work – negotiation skills ,etc.	Quasi-experimental non randomized design, 2 IG & 1 CG. School & community based. One theoretical concept used: self-efficacy.	Over 9 months	New peer leaders (IG) had a higher mean score for AIDS' knowledge & perception of one's self as a change agent in the community than the CG at baseline. Post intervention AIDS knowledge increased significantly > among repeat peer leaders than new peer leaders.	Peer education programme resulted in sustained behaviour over time.

Reference	Location/Sample of Baseline	Programme Description	Design	Months of Observation	Results: Change in Outcome	Conclusion
F. Flay <i>et al.</i>, 2004	School & community based, in 12 schools in Chicago, n = 573, Grades 5-8	3 interventions: (IG) Social Development Curriculum : 16-21 sessions in school-skills based & School/Community Intervention : parent programme (CG) Health Enhancement Curriculum : skills building to promote nutrition & health	Cluster randomized trial , IG & CG, Theories of Behaviour Change	Not listed	For boys the social development curriculum & the school/community intervention significantly reduced the rate of violent behaviour, provoking behaviour, school delinquency, drug use, recent sexual intercourse & increased condom use; compared to the health enhancement curriculum.	Theoretically derived social-emotional programmes that are culturally sensitive, developmentally appropriate can reduce risk behaviours for inner city African American boys. There were no effects for girls.
G. Kirby <i>et al.</i>, 2004	School-based, included 20 schools in California, n = 3869, all ninth Grade learners	Safer Choices (IG) HIV/STI & pregnancy prevention programme (CG) Peer leaders, parent, teacher & community involvement Knowledge-based HIV education programme	Intervention randomized control design, IG & CG. Social Cognitive Theory based.	31 months	Safer choices had > impact on males & on Hispanics in delaying sexual activity. Overall - an increase in condom use among learners who had engaged in unprotected sex before the intervention.	Safer choices curriculum resulted in positive behaviour change in the IG than CG.

Key: IG- intervention group; CG - control group; > - more; < - less

The following section outlines in more detail school-based HIV/AIDS prevention programmes among learners as listed in Table 2 above.

A. 'Project B.A.R.T.' (Be A Responsible Teenager) (St. Lawrence *et al.*, 1995) was a theoretical intervention, based on Bandura's social learning theory (Bandura, 1992) and the three-factor conceptualization of AIDS preventive behaviour, namely information, behaviour and motivation (Fisher and Fisher, 1992). This intervention involved an eight week programme among 246 African American adolescents, in a community setting. The programme consisted of one twelve hour session per week for eight weeks. Adolescents first learned the safest method of prevention, which is abstinence, and then learn how to protect themselves should they decide to be sexually active. Skills building exercises together with interactive group discussions, role-plays, videos and interactions with HIV members of the community, formed part of the programme. This one group pretest and posttest intervention used self-reported questionnaires and was evaluated immediately post-intervention and twelve months post programme.

The B.A.R.T. intervention recognized that all the behaviours associated with HIV risks were interpersonal and occurred within social interactions. Social effectiveness, competence in decision-making, vulnerability to peers and negotiating situations were components linked to social interactions within the B.A.R.T. curriculum. Project B.A.R.T. was developed to help adolescents acquire the skills and self confidence needed to reduce risks for HIV, thus

encouraging them to make safe, healthy choices concerning sexual behaviours. The summary of the programme sessions included:

Session 1: Information about HIV/AIDS – statistics, facts, risk behaviours, safe behaviours, prevention

Session 2: Making sexual decisions and understanding your values – group discussions about sexual behaviours, pressures adolescents experience, use of alcohol and drugs, video on youth talking about sex

Session 3: Developing and using condom skills – explores positive and negative attitudes towards condom use, overcoming barriers to their use, condom skills

Session 4: Learning assertive communication skills – review of correct condom use and video

Session 5: Practicing assertive communication skills – skills training on saying ‘no’

Session 6: Personalizing the risk – peer guest speaker who is HIV positive shares experience

Session 7: Spreading the Word–focus on self management and problem solving strategies, assertiveness skills, refusal skills, – role plays, brainstorming how to spread word to peers

Session 8: Taking B.A.R.T. with you – participants identify what was most helpful to them in terms of personal changes with a view to increase self–efficacy among subjects so that risk reduction activities can be implemented

The programme was found to be significantly more effective (immediately and also one–year post programme) than a one–session education programme, in reducing unprotected sex, increasing condom protected sex and displaying increased behavioural skills (St. Lawrence *et al.*, 1995). Adolescents lowered risks and maintained changes (St. Lawrence *et al.*, 1995).

Project B.A.R.T. has been recommended by the Centre for Disease Control (CDC) as meeting the CDC HIV/AIDS Prevention Research Synthesis project criteria for relevance and methodological rigor, and has had positive and significant behavioural health findings for the Compendium (Centre for Disease Control, 1999).

In support of the B.A.R.T. intervention, researchers (Butt and Hartman, 2002) reported that the intervention had a positive impact on AIDS Risk Knowledge and HIV Attitudes questionnaires, among adolescents aged 11 to 19 years of age, from a residential setting in the United States. Self-reported questionnaires were completed at the beginning and upon completion of the programme. The B.A.R.T. programme made a statistically significant positive impact on AIDS risk knowledge and HIV attitudes. However, there were no significant effects on the condom attitude scale and the risk behaviour survey. The authors reported that since subjects in this study were in a residential setting the close supervision at all times did not allow them to participate in sexual activities. One limitation of the study is that it did not include a control group. The B.A.R.T. intervention is however recommended as being a blueprint for future interventions.

B. A theory-based sexuality curriculum for adolescents called 'Reducing the Risk', targeted specific behavioural goals and was based on the social learning theory (Hubbard *et al.*, 1998). It involved activities that personalized information on the risks of unprotected sex, trained on social influences and supported personal values and group norms against unprotected intercourse. In addition current information on HIV, pregnancy prevention and adolescent

sexuality; together with role-plays on skills training, was implemented. A self-reported survey was administered to the intervention and comparison groups before and eighteen months after the intervention.

This curriculum was implemented in five school districts in rural and urban areas of Arkansas. Teachers were trained for three days on programme implementation. The 'Reducing the Risk' curriculum delayed sexual initiation (which is the most effective method to prevent pregnancy) and STI and increased condom use and other pregnancy preventing contraceptive use significantly compared to the control groups. Learners that received this curriculum were more likely to communicate with their parents about issues discussed. These results were notable given that the control group received the curriculum routinely provided by school districts. The data suggested that a theory-based curriculum that provided contraceptive information and employed skills-building activities was more effective than more traditional and abstinence only curricula.

C. 'My Future is my Choice' a HIV intervention was developed and evaluated in the United States on African-American learners, and implemented in Namibia among learners 15 to 18 years of age (Fitzgerald *et al.*, 1999). The curriculum included information on reproductive biology and HIV/AIDS, other risk behaviours, including alcohol, substance abuse and violence in relationships, communication skills across genders and age differences, especially young girls and older men, were discussed. Sessions contained narratives, games, facts,

exercises and discussions. The curriculum was based on the Theory of Protective Motivation. Sessions were facilitated after school hours for fourteen weeks, in groups of fifteen to twenty. Learners completed a risk assessment instrument at baseline and immediately after the intervention. Statistically significant changes in knowledge, attitudes and intentions regarding HIV risk activities and marginally statistically significant changes in risk behaviours were found. Positive changes for both genders were also found. UNAIDS has recommended this project as a best practice intervention (UNAIDS, 2000). These findings provided support for the use of Western HIV prevention programmes in other cultural settings including Africa, however the effect of this safer sex intervention was not monitored over time and this area needs to be explored in further research in African countries.

D. A pre–post ‘Health Promotion Project’, was undertaken among 496 inner–city African American adolescents (Jemmott *et al.*, 1999). The HIV risk intervention was theoretically based and focused on knowledge of HIV and STIs, risk reduction behaviours and to increase self–efficacy to use condoms. The intervention included five hour sessions with six to eight adolescents per group. In addition it included group discussions, videos, games, experimental exercises and skills building activities. The intervention was culture sensitive and developmentally appropriate for adolescents. The control group sessions included general health promotion with information on general health conditions like heart disease, stroke and hypertension. Learners completed confidential self–reported questionnaires pre–intervention, immediately after the intervention, three months and six months after the intervention. Learners were asked to complete self–reported sexual behaviour over a brief period to increase the validity of self–reported measures. The results of this study showed that

cognitive-behavioural interventions reduced HIV risk-associated sexual behaviour, and induced positive changes in theory-based mediators of such behaviour among African American adolescents. The HIV risk-reduction intervention influenced the mediators of behaviour change, derived from the Social Cognitive Theory and the Theory of Planned Behaviour, in the desired direction. More favourable beliefs regarding condom use, self-efficacy to use condoms, stronger intentions to use condoms and higher HIV risk-reduction knowledge were evident in the intervention group than those in the health promotion component. Moreover, the effects of the intervention on knowledge, beliefs, self-efficacy and intentions were sustained over six months.

E. An integrated school-and health-clinic based adolescent reproductive health initiative was undertaken in Brazil among adolescents (Magnani *et al.*, 2001). The programme aimed to promote responsible sexual behaviour, including the use of clinics. Ten clinics were identified and each was paired with a high school partner. At selected schools a comprehensive sexual and reproductive health education (SEC) programme was introduced. Topics included sex, anatomy, biology, myths, beliefs, pregnancy and STIs. The intervention strategy called for trained teachers to integrate sex education into the regular curriculum by targeting a proportion of class sessions (30%) in the disciplines of Portuguese, biological sciences, art and history. Sessions were for one to two hours per week. A key design feature of the project was the integration of school and clinic based sexual and reproductive health efforts, including referral of learners in need of sexual and reproductive health services from schools to clinics, meetings between teachers and health service providers, visits by teachers to health facilities,

visits by health personnel to schools and meetings between clinic directors and education and health system district managers.

Over thirty months, changes in sexual and reproductive knowledge increased significantly in terms of positive changes in attitudes, perceptions and intentions. This increase was for both the intervention and control group and therefore could not be attributed to the project. Despite the negative findings on sexual behaviour and contraceptive use, a reported increase in sexual and reproductive health information from clinics to schools was evident. No effects of the project were found for levels of sexual activity or contraceptive behaviour. Although the programme evaluated improved the adolescents' access to services, the observed changes in service-use levels were not related to the degree of clinic-learner's friendliness, but were associated with the level of the local community's acceptance of such services for young people. However, the larger impacts of the project may be seen once the project becomes better established. The findings of the study suggest that future programmes should target adolescents and health services, together with community social norms, around their use, if sustained increases in young people's use of clinic-based health services are to occur. Sexual and reproductive health is influenced by many factors including personal factors and environmental factors. Therefore interventions have to be implemented at multiple levels to be effective (Magnani *et al.*, 2001).

F. Protect Teen Health Programme, was a community and school-based intervention, in the United States (Pearlman *et al.*, 2002). The community programme offered health-related

services, such as parenting skills for teenage mothers and school-based health education classes, which included topics on human sexuality. The intervention consisted of a peer leadership AIDS prevention course, and ongoing group work with an adult advisor to learn about HIV transmission, to model and practise communication and negotiation skills around sexual risk-taking behaviours and to plan HIV-related activities for other learners. The evaluation of Project Teen Health Programme compared newly enrolled peer leaders and a comparison group. To assess the sustainability of results, the researchers compared newly enrolled and repeat peer leaders. The study concluded that peer leadership can be an effective strategy for increasing an adolescent peer leader's knowledge about HIV and confidence to be a change agent for HIV information. Nine months after the initiation of the programme, newly enrolled peer leaders were more knowledgeable about HIV/AIDS, and more confident about being learners' leaders for HIV prevention than the comparison group. The intervention had both lasting (monitored over nine months) and value added benefits for programme participants who enrolled as peer leaders. Trained peer leaders could therefore be used to help learners avoid high-risk situations. Although knowledge alone was insufficient to change behaviour, an increased understanding of HIV/AIDS may be a necessary pre-requisite to change behaviours that put one at risk of HIV transmission. The supervised training of adolescents, to develop and deliver HIV/AIDS prevention messages to other learners, was therefore, a viable and effective means of increasing adolescent peer leaders' confidence to participate meaningfully in community health HIV/AIDS prevention efforts. The perceived benefits of peer leadership were greater for repeat peer leaders, than those newly enrolled in the programme. The majority of repeat peer leaders reported improved presentation and leadership skills and higher self-esteem. The findings support a growing body of literature

that adolescent peer leaders benefit most from their training, when they have a sufficient window of opportunity to implement activities that are meaningful to themselves for which they assume responsibility and have some control.

G. The effects of three interventions designed to reduce high risk behaviours among inner-city African American learners, in Chicago was tested (Flay et al., 2004). The Social Development Curriculum (SDC) consisted of sixteen to twenty-one lessons which focused on social competency skills, the School/Community Intervention (SCI), while the control group received a placebo Health Enhancement Curriculum (HEC) on nutrition, physical exercise and general health care. This study aimed to test multiple behaviours, which were often neglected areas in research, including violence, provocative behaviour, school delinquency, substance use and sexual behaviours (sexual intercourse and condom use). The curriculum was based on the theories of behaviour change. Self-reported questionnaires were completed at baseline and post intervention. For boys the SDC and SCI statistically significantly reduced the rate of increase in violent behaviour by 35% and 47% respectively, provoking behaviour (41% and 59%), school delinquency (31% and 66%), drug use (32% and 34%) and recent sexual intercourse (44% and 65%) and improved the rate of condom use (95% and 165%). The SCI was statistically significantly more effective than the SDC for a combined behavioural measure (79% improvement vs. 51%). There were no statistically significant effects for girls, and this area needs to be evaluated in future research. The study supports evidence that the dominant prevention strategies may work better for boys than girls. The literature for girls suggests that programmes need to focus more on internal manifestations of risks, and on connectedness to school and family to be effective. A major strength of the SCI programme

was the strong partnership developed with community organizations, including a community based mental health organization.

H. The 'Safer Choices' intervention was based on the Social Learning Theory (Kirby *et al.*, 2004). This was a two-year school-based HIV/STI and pregnancy prevention programme for high schools in California. A self-reported baseline survey was completed together with a follow-up survey post intervention. 'Safer Choices' had a positive impact across a variety of groups regardless of gender, ethnicity or sexual experience. On all four measures of condom use (number of times of unprotected sex, number of partners unprotected, condom use at last sex and contraceptive use at last sex), interaction effects were detected suggesting that 'Safer Choices' had a greater impact on males than females. This is consistent with the fact that males typically had more direct control over condom use than females. 'Safer Choices' had a greater impact on learners who initiated sex after the baseline, than on learners who were already sexually active at baseline. The intervention further appeared to have a greater impact on condom-related behaviours among higher risk learners who engaged in unprotected sex before the intervention, than among learners who initiated sex after the intervention. The intervention also had greatest impact on learners who initiated sex after the baseline and those who initiated sex before baseline and engaged in unprotected sex during the previous three months. It had less impact on learners who engaged in sex before the baseline but did not engage in unprotected sex during the previous three months. Overall the results demonstrate the impact of the intervention was not limited to any single group defined by any learner characteristics examined. Further the programme can be effective with learners both before

and after they had initiated sex. This is contrary to research in favour of programmes taught before they initiated sex. It was also most effective with high risk learners.

Interventions conducted in settings other than the school environment are included below. They further draw support for the importance of theoretically based approaches to behaviour change.

2.5.2.2 Non School–Based Interventions

A. A social cognitive approach to AIDS risk behaviour among inner city black adolescent women in New Jersey was called the ‘Healthy Living Programme’ and was held over a three week period (Jemmott *et al.*, 1992a). The study design incorporated multiple interventions, with the group being randomly assigned to attend a 105 minute social cognitive component or 105 minute information alone component. Thereafter all participants attended a 105 minute general health promotion component. Subjects completed self–reported questionnaires pre and post intervention. The social cognitive component was designed to increase confidence regarding condom use, although abstinence was mentioned. The intervention included culturally and developmentally appropriate exercises, games and videos, together with role plays, condom skill and it addressed beliefs and myths around condom use. In the information session, AIDS, STIs, facts and myths were discussed, the group watched a video on AIDS information and played AIDS basket ball, where they earned points for answering correctly questions on AIDS. In the combined health information session information on diet and exercise was presented. Women in the social cognitive component expressed greater

confidence and had stronger intentions, regarding their ability to use condoms. They also believed more strongly that condoms did not curtail sexual excitement, than the other two components of intervention. Adolescent women in the information-alone and social cognitive component scored higher in AIDS knowledge than the other component of intervention. Those who received the social cognitive intervention reported greater perceived self-efficacy regarding their ability to implement condom use and believed more strongly that condoms do not curtail sexual enjoyment. Perceived self-efficacy is an important determinant of AIDS risk associated behaviours. However the adolescents in the information-alone session did not express greater intentions to use condoms than did those in the health promotion, therefore supporting studies that indicated that AIDS knowledge and prevention beliefs were unrelated to precautionary sexual behaviour and attitudes towards such behaviour. The study questions whether the observed increase in condom use intentions would result in increased usage of condoms.

B. *St Lawrence et al.*, (1995) reported on an HIV risk reduction programme that addressed the impact of sex education on onset of sexual activity and examined reductions among already sexually active learners. African American adolescents from the United States were administered a Behavioural Skills Training which consisted of eight, 90 to 120 minute, weekly group meetings. This intervention included AIDS education, sexual decision making and values, technical competency skills—for example, correct condom use, social competency skills, cognitive competency skills, social support and empowerment and role-plays. The control group included a two hour educational intervention. Self-reported questionnaires were completed pre-post intervention, at six months and twelve months. The study reported that

male adolescents engaged in higher rates of sexual activity than female adolescents and females were significantly lower in all sexual behaviours than male adolescents at programme entry. Female participants increased their frequencies of unprotected intercourse after the information only session to a greater extent than the females who participated in the skills training. Further the latter group maintained stable lower levels of unprotected vaginal sex or discontinued the practice of anal sex. This behaviour was maintained throughout the following year. By twelve month follow-up both sexes in the information only session were engaging in more frequent unprotected vaginal intercourse than those in the skills training group. With regard to condom use, the skills training intervention was more successful both in lowering risky behaviour and in sustaining safer alternatives such as condom use for those who remained sexually active. An interesting finding in this study was that the onset of sexual activity among sexually inactive learners was 31% among the information group and 11.5% among the skills intervention group. Therefore sexually explicit interventions do not promote increased sexual activity among learners who were sexually active, and deferred the onset of sexual activity for learners who were abstinent at programme entry.

C. A cognitive/behavioural intervention among delinquent and abused adolescents was conducted in St Louis Missouri (Auslander *et al.*, 1996). Fifteen residential settings were randomly assigned to three groups namely skills training, discussion only and control group. The content of the skills training and discussion groups were identical, however the method of delivery was different. Role-plays, modelling, etc. formed part of the skills training while the discussion groups talked about prevention of HIV/AIDS using problem solving techniques. The results of this intervention showed that the discussion group produced a long-term effect

of increased knowledge about prevention of HIV/AIDS and a higher reported capability to cope with high risk situations related to AIDS. However, neither the skills nor the discussion group produced a long-term reduction in the level of engagement of high risk behaviours. The authors explain the results in terms of the Theory of Life Chances or Life Options (Dahrendorf, 1979). This perspective states that those individuals that have opportunities such as higher education and adequate housing, develop positive expectations about the future and hence stay away from high risk AIDS related behaviour. Those with negative expectations about the future make little attempt to preserve or improve their lives, and are more likely to report engaging in AIDS related risky activities. Adolescents who have perceptions of more chances to obtain higher education behaved in a way that did not jeopardize their ability to secure a more promising future, compared to those who did not have such a perception and did not make an attempt to avoid the risk of contracting AIDS. Thus based on this perspective, cognitive/behavioural interventions that provide knowledge and skills are insufficient to motivate highly troubled adolescents to reduce their engagement with risky activities in the long term. These adolescents may therefore require more than nine sessions to produce long-term change.

D. Abstinence and safer sex behaviours among 659 African-American learners in Philadelphia were explored (Jemmott *et al.*, 2002). The Abstinence Intervention measured condom use, but stressed delaying the initiation of sex and reducing the frequency of sex. The Safer-Sex Intervention indicated that abstinence was the best choice, but stressed that adolescents should use condoms if they decided to have sexual intercourse. Both interventions were facilitated by an adult or peer co-facilitator and reduced HIV sexual-risk behaviours.

Safer sex interventions were however more effective with sexually experienced adolescents and had longer lasting effects. There was less intention reported to engage in risky behaviours at immediate and three-month post-test. Black male adolescents, from Philadelphia, had greater knowledge but less positive attitudes and intentions regarding sexual risk behaviour than those assigned to a control intervention on career opportunities (Jemmott *et al.*, 1992b). The AIDS risk reduction intervention was a five hour programme which included information on risks associated with drug users and specific sexual activities. Culturally sensitive videos, games and exercises were used. Participants completed pre- and post-intervention questionnaires. Adolescents in the intervention group reported lower intentions of engaging in sexual behaviours, less favourable attitudes towards sexual risk behaviour and greater AIDS knowledge. These results were further sustained at three months.

2.5.2.3 Mass Media Interventions

Mass media interventions have also been instrumental in AIDS prevention efforts in South Africa. These include the LoveLife Campaign and Soul City Campaign, among others. These campaigns are national multimedia HIV/AIDS programmes and use television, radio and print media to cover topics of violence against women, AIDS and youth sexuality including interactive participation (Soul City, 2001). More specifically the LoveLife programme includes billboards, telephone hotlines, youth centres, school sports days and a clinic intervention. The LoveLife programme combines a sustained multi-media awareness and education campaign with a nationwide programme of youth friendly sexual health and outreach services (Pettifor *et al.*, 2005). Young people who participated in at least one

LoveLife programme were reported to be less likely to be infected with HIV (Pettifor *et al.*, 2005). However data indicates that the LoveLife programme is ineffective in changing behaviour positively and some researchers dispute the reports of decreased HIV infection among youth (Parker and Colvin, 2006). Findings from the Reproductive Health Research Unit (RHRU)/LoveLife consortium indicated that among all youth 3% reported looking for more information on LoveLife, 1% called 'thethaJunction', 16% had not heard about LoveLife and 61% did nothing with the information they received (Parker and Colvin, 2006). The Medical Research Council further reported that the LoveLife programme has not had an impact on youth HIV prevalence in South Africa (Jewkes, 2006). The finding of a 40% reduction in HIV risk in those participating in any of these interventions seems to lack analytical rigor and impact on behaviour change (Jewkes, 2006).

A simplistic report of Soul City also indicates that people who watched, listened or read about Soul City were more likely to say they had asked their partner to use a condom. Twenty seven percent of respondents who had exposure to three episodes of Soul City asked their partners to use a condom in the past six months in comparison to 20% of respondents who had no exposure to Soul City. Of the young respondents (16 to 24 years of age) exposed to Soul City 26% of those who did not watch Soul City always used a condom while 38% of those who watched Soul City a lot always used a condom (Soul City, 2001). Mass media interventions have a role to play in AIDS prevention however they need to be re-evaluated in terms of the producing more positive effects in terms of behaviour change.

2.5.2.4 Conclusions and Recommendations on HIV/AIDS Prevention Interventions

These results further support a theoretical framework as a basis for effective interventions and should attend simultaneously to informational, motivational and behavioural competencies for sustainable impact (Fisher and Fisher, 1992). In reviewing the intervention studies published to date the key elements that effective interventions should include comprise of the following (St. Lawrence *et al.*, 1995):

- a. A conceptual foundation grounded in social learning theory,
- b. Equal emphasis on abstinence and on lowering risk behaviour rather than promoting abstinence as the only option,
- c. Involvement of participants in active, rather than passive learning,
- d. Equipping learners to counter peer and social pressures into sexual activity,
- e. Offering alternatives for unprotected intercourse through abstinence, condom use or avoiding risky situations,
- f. Provision of specific skills training through modelling and communication skills that are developmentally appropriate and culturally relevant for their intended recipients.

Further, in a review of forty-one studies of health interventions for adolescents, researchers reported that school programmes tended to be grounded in one or more behavioural theory although curricula and delivery format varied (Speizer *et al.*, 2003). The Social Learning Theory, AIDS Risk Reduction Model, the Theory of Reasoned Action and the Health Belief Models were commonly used. Similar findings were reported by Robin *et al.*, (2004). In addition, with regard to the effects on behaviours, six of the fourteen school-based AIDS

interventions demonstrated behavioural effects in terms of reducing partners and increasing use of condoms (Robin *et al.*, 2004). Behavioural measures most frequently used in interventions included delay of initiation of sexual intercourse, condom use, contraceptive use and frequency of sexual intercourse (Robin *et al.*, 2004). In addition, the period of follow-up in programmes ranged from six to twelve months to one to five years; the duration of sessions also varied together with programme facilitators (Robin *et al.*, 2004). The delay in initiation of sexual intercourse was most inconsistent in all behavioural studies while condom use was most consistently impacted (Robin *et al.*, 2004). Research also reported consistently that theory based interventions that taught behaviour skills were more likely to have positive outcomes than non theory based interventions (Robin *et al.*, 2004). There was some discrepancy between health intervention studies of whether these behaviours could be sustained over time (Speizer *et al.*, 2003). The impact of knowledge and attitudes was evaluated in eight of these programmes.

With regard to mass media programmes all of the projects reported at least one desirable behavioural effect, except the ones in South Africa where no positive behaviour change was reported among learners (Meekers, 1998). The LoveLife and the Soul City programmes for example did not produce any positive sustained behaviour change among youth (Jewkes, 2006; Parker and Colvin, 2006). Community—and peer—based programmes were common among adolescents and have reported positive behavioural outcomes, in the majority of the studies reviewed (Speizer *et al.*, 2003). This disproves the belief that sexual reproductive health information increases levels of sexual activity.

Of the few interventions that have been rigorously evaluated there is therefore little evidence available on the long-term behavioural effects of HIV/AIDS prevention interventions. It is recommended that consistent, accurate information, Life Skills', social support, access to contraceptives and appropriate health services are essential for adolescent reproductive health (Speizer *et al.*, 2003). Evidence suggests that these needs can be provided in a variety of ways, but the most effective way is to vary provision by gender, by developmental stage and setting (Speizer *et al.*, 2003). It might also be appropriate to involve multi component interventions that influence multiple risk and protective factors in order for large and sustained behavioural impacts. Limited resources, cultural sensitivities surrounding sex, ethical issues around programmes with learners in resource poor areas, multiple interventions and high mobility of the target groups were difficulties that programme directors experienced. Rigorous evaluation of interventions should therefore be a standard component which would be cost effective in the long-term with regard to reproductive interventions for learners.

The intervention programmes discussed above were largely western-based and whether they could be efficacious in other cultures has not been rigorously evaluated. The development of new culture specific programmes are preferable, however the magnitude of the AIDS epidemic and the high costs associated with this development make western interventions a viable option. Researchers in Namibia (Stanton *et al.*, 1998) and in Tanzania (Klepp *et al.*, 1997) implemented Social Cognitive Theory models and found increases in knowledge, improved attitudes and increased abstinence behaviours. This study therefore supports the applicability of western models to other cultural contexts including Africa (Fitzgerald *et al.*,

1999). Further the 'Mwanza Trial' among adolescents in Tanzania was conducted by the London School of Hygiene and Tropical Medicine, together with various local government institutions. The trial resulted in a decreased incidence of HIV by 40% in the intervention group compared to the control group. The integration of the sexual health programme into existing health care services was shown to be cost effective and feasible to replicate in resource poor settings (Philpott *et al.*, 2002).

For intervention studies it is recommended that more programmes should target the delay of sexual initiation. Further, the implications for programme effectiveness depends on skills that reduce specific risk behaviours, the duration and content of the programme and programme facilitators training (Robin *et al.*, 2004). These factors are supported by researchers who reported that intervention programmes may be strengthened by the inclusion of a theoretically based framework, because 83% of theory based programmes successfully increased condom use intention (Kim *et al.*, 1997). However interventions that employed community input or used culturally relevant material were successful in reducing the number of sex-partners (Kim *et al.*, 1997). Teaching skills in negotiation and communication strengthened behavioural outcomes while the effect of programmes that increased condom use and decreased the number of sex partners were two or three times longer in duration (Kim *et al.*, 1997).

In practice there are many interventions including the compulsory Life Skills' HIV/AIDS Programme (LHAP) that has been implemented, but their effectiveness in promoting

behaviour change has not been validated. In South Africa whilst some successes have been noted in the implementation of the Life Skills' programmes at schools, the distribution of male condoms, increasing access to Voluntary Counselling and Testing (VCT), mass communication strategies and STIs management programmes have been insufficient to impact on the continued spread of HIV infection (Abdool Karim and Abdool Karim, 2005). In KwaZulu-Natal, learners reported higher knowledge levels of STIs and use of protection against STIs but low reports of safer sex behaviours. The authors recommend an inclusion of elements of gender sensitivity and communication skills in sexual education programmes (James *et al.*, 2004). Prevention efforts in South Africa however need to be up-scaled and lessons learnt from past research needs to be incorporated into different cultural environments, to make them relevant for the population under study.

Schools were reported to be the most common place that youth HIV/AIDS programmes were implemented, as large numbers of learners could be reached on a regular basis in this environment while clinics and community centers were also used as research sites. Some programmes have been found to reduce sexual risk-taking behaviours irrespective of the setting. More specifically, the initiation of sex was delayed in most programmes for at least six months. Sexual activity or abstinence behaviour did not show an increase but in some studies a reduction in frequency was reported. Further, programmes indicated no increase in sexual partners but some programmes resulted in a decrease in the number of partners. The impact of condom use showed an increase in condom use in almost half of the studies evaluated. Fewer studies reported on the impact of contraceptive use, with six studies showing an increase in

contraceptive use and one showing a decrease in contraceptive use. Irrespective of whether results were self-reported or laboratory tested, programmes did not have a significant positive impact on STI and pregnancy rates.

Overall in two-thirds of these studies Family Health International (2005) indicated a significant positive impact on one or more behaviour outcomes outlined and seven percent found a significant negative outcome (Kirby *et al.*, 2005). For example, the MEMA Kwa Vijana intervention in Tanzania reported a reduction in the number of sexual partners among boys and increase in condom use. Similarly, the Safer Choices programme delayed the initiation of sex among Hispanic learners and increased condom use and contraceptive use. Finally, project B.A.R.T. (Be a Responsible Teenager) curriculum, increased abstinence, reduced the number of sexual partners, increased condom use and reduced unprotected sex. While the positive effects of some programmes lasted a few months, the effects of other programmes lasted for years, including the MEMA Kwa Vijana intervention and the Safer Choices programmes which were evaluated for thirty six months and thirty one months respectively. The replication of health programmes have shown that these curricula can be effective when implemented in different communities and cultures throughout the world, irrespective of socio-economic status, rural or urban areas, gender or setting. This indicates that these programmes were robust. However the magnitude of this impact did not indicate a dramatic reduction of sexual risk-taking, of STIs or pregnancy rates.

In addition, several mediating factors including knowledge, perceived risk, values, attitudes, and perceptions of peer norms, self-efficacy and other skills contributed positively to behaviour change, which is consistent with psychosocial theories described earlier in this chapter. Most educational programmes reported an increase in knowledge about HIV, STIs and pregnancy prevention. Half of the sixteen studies that measured perceived risk of HIV were effective at increasing perceived risk. Four of the eight studies found an increase in perceived severity of HIV/AIDS, while two were effective at increasing perceived severity of pregnancy. Further, attitudes towards coercive sex and perception of barriers to condom use improved. Perceived peer behaviour and norms also improved by 40%, and programmes helped teens realize that fewer of their peers had had sex and that their peers supported abstinence or condom use. With regard to self-efficacy more than half found improved self-efficacy to refuse unwanted sex and more than two thirds found increased self-efficacy to use condoms. The motivation and intentions to abstain from sex, restrict the number of sexual partners, or use condoms, increased in two-thirds of the population.

Therefore the positive changes in the mediating factors described, have demonstrated empirically to be related to sexual behaviour change. It is highly likely that changes in these factors would contribute to further changes in sexual risk-taking behaviour among other young people. Intervention programmes should therefore be viewed as an effective component in the larger effort of HIV/AIDS, STI and pregnancy prevention.

2.6. Critique of Literature Review

HIV prevention research among young people has been conducted primarily in schools and health settings in western countries with less research reported in African countries including South Africa. However, it is in the high prevalence countries like South Africa, with resource constraints and problems in school infrastructure that more prevention interventions should be undertaken. It is also in these settings that AIDS prevention interventions are most challenging to implement. Prevention interventions therefore need to reach those most at risk for acquiring and transmitting the infection out of sheer necessity to reduce the incidence of HIV.

Most of the studies reviewed in the literature review have been based on social cognitive models and social learning theories. Theory based interventions have been reported repeatedly to provide valuable information on individual behaviour and assist in designing and evaluating different populations of people in a variety of settings. Having a theoretical framework that guides programme design and evaluation has been recommended as essential for successful programmes (Kirby, 2000). The range of study designs and outcome measures however varied, with different studies reporting different behaviour and determinant markers of change (Kirby, 2000). It was therefore difficult to compare studies in this review with each other and to determine what the best practice model was in order to replicate similar findings.

De Vreis *et al* (2005) I-Change model integrates many concepts of Social Learning Theories, while the Health Belief model (Janz & Becker, 1984) explains behaviour according to how

individuals perceive behaviour. Gender empowerment theory highlights the role of gender power imbalances that influence decision making in heterosexual relationships (Connell, 1987) while the three factor IBM model emphasizes the importance of information, motivation and behavioural skills in AIDS prevention (Fisher & Fisher, 1992). A framework which recognizes that perceptions of risk and sexual behaviour are not always individually determined and that gender and social context are also critical determinants of behaviour is also essential to consider. Social and environmental influences have often been overlooked in research studies with greater emphasis placed on behaviour outcomes. Understanding the milieus of learners at schools and in different societies is however imperative to draw a deeper understanding into the individual components of behaviour change. While there are merits in many of the models outlined they rely largely on cognitive processes to change behaviour. Bandura's (1986) theory incorporates environmental factors together with cognitive processes to explain behaviour change in the concept of 'reciprocal determinism', which is an important component to consider.

The researcher has chosen to focus predominantly on the TRA/TPB in this study. This model incorporates many of the concepts of other Social Learning Theories with the inclusion of cognitive and environmental influence on behaviour. Further many HIV studies have drawn support for the effectiveness and validity of the TRA/TPB (Ross *et al.*, 2006). The relative importance of attitudes, beliefs, subjective norms, and self-efficacy, for the prediction of intentions, is however expected to vary from behavior to behavior and population to population (Ajzen, 1988, 1991). In a meta-analysis based on 185 independent studies the TPB was found to account, on average for 39% of variance in intentions and for 27% of variance in

behavior (Armitage & Conner, 2001). The Theory of Reasoned Action is reported to be definitely rooted in the scientific perspective because this theory has the ability to explain and predict the behaviors it involves (Fishbein & Azjen, 1975). Its explanatory power is strong and it has the ability to provide plausible explanations for the phenomena. It is a simple theory that still has the ability to predict and explain behaviour (Fishbein & Azjen, 1975). Although the Stages of Change Model (Prochaska *et al.*, 1994) is useful for interpreting behaviour change, it focuses on individual cognitive processes that direct change with the exclusion of contextual factors. Further individuals may pass over many of the stages of this model in a less linear and less ordered manner than the model describes. Therefore the TRA is a better choice of a model.

Research interventions have focused on behaviour outcomes such as condom use and determinant outcomes such as changes in knowledge, beliefs, etc. There has been little consideration for psychosocial processes which lead to such outcomes. Gender norms further underlie attitudes and belief systems, with stereotype gender specific behaviours. Face to face interactions with learners, teachers and community members could therefore elaborate on the psychological and social milieus of learners together with identifying negative belief and attitudes systems. Qualitative methodologies are important to facilitate a better understanding of adolescent behaviours and the psychosocial processes involved in decision making.

There is evidence to suggest that school based interventions among learners in terms of HIV prevention is useful. For example, attitudes and self-efficacy to use condoms together with

intentions to abstain from sex and condoms use, displayed positive outcomes in many studies reviewed (Gallant & Maticka-Tyndale, 2004). Participatory learning techniques were successfully used to facilitate this process. Knowledge of HIV infection and information on self protection may coerce learners to use condoms even if they do not like them due to it being socially desirable. The question of self-reported measures in sexual behaviour has many limitations however there is also evidence of the validity of self-reported measures in many studies (Jemmott *et al.*, 1992a; Vries *et al.*, 2003; Ajuwon *et al.*, 2006).

The adaptability of western interventions to African countries has been established in studies in Africa (Gallant & Maticka-Tyndale, 2004). In the South African context there is very little research with a strong theoretical basis and even less critical analysis of the efficacy of theoretical models. There was therefore a need to facilitate this process.

The Life Skills' programme has been implemented with varying degrees of competence in South African schools. There was however no quality measurement in place in schools to assess the outcomes of the Life Skills' programmes so one couldnot establish how effective it was in AIDS prevention and behaviour change. Teacher's discomfort in discussing sexually explicit material in terms of personal or religious norms is a hindrance to the Life Skills' intervention in schools and needs to be addressed. Teacher and peer led interventions were common in the studies reviewed however this may become problematic in South Africa with the high demands placed on teachers in terms of their work load and the rapid turnover of peer leaders to remunerated jobs. Alternative facilitators therefore need to be considered. Health

promotion staff with professional backgrounds may be more competent and more accessible to address the demand for health promotion and behaviour change strategies in future interventions. The Department of Health's focus on "Healthy Lifestyles" complements this school-based approach (Department of Health, 2008).

Research efforts have predominately been pre-post evaluation together with randomized controlled trials. The durations of studies have varied. The maintenance of behaviour change may be better established in longer term interventions as illustrated in some studies. The factors that lead to maintenance of behaviours in some studies while not in others have not been clearly established. The absence of immediate attention to behaviour change in some programmes can further be justified by the short period of evaluation.

The literature review has highlighted that there is no single intervention that is likely to produce behaviour change on all populations of youth however it is important that youth are provided with consistent, accurate messages and information, the Life Skills' needed to protect their health and wellbeing, access to contraceptives and social support (Speizer *et al.*, 2003). In light of the many practices of risky sexual behaviour evidenced among youth in this review and in view of the high prevalence rates of HIV in South Africa, the school based study was undertaken. The school environment provided an excellent venue to reach a large number of learners at one given time (Jemmott & Jemmott, 2000, Gallant & Maticka-Tyndale, 2004). Further studies have shown that most pupils in sub-Saharan Africa initiate sexual activity while they are still at school (Kaaya *et al.*, 2002).

The researcher choose to implement the US based intervention for youth in South Africa as the major theoretical components of the TRA model were included in this intervention including HIV/AIDS information, beliefs, attitudes, skills building exercises to improve self-efficacy levels and exploration of social norms through group participatory exercises. The B.A.R.T. intervention was further recommended by the Centre for Disease Control as a best practice model.

The literature review has provided a comprehensive overview of the currents trends in risky behaviours among youth and the intervention efforts in this area. It has further highlighted the difficulties in sustaining protective behaviours and the limited success rates of multiple interventions. No single intervention produced changes in all behaviour outcomes on all populations of youth however it is important that youth are provided with consistent, accurate messages and information, the Life Skills' needed to protect their health and wellbeing, access to contraceptives and social support (Speizer *et al.*, 2003). Most studies have been implemented in the west with limited studies in African countries and fewer in South Africa. The researcher has drawn on the recommendations of authors to utilize a theoretically based intervention, to consider contextual issues through the use of qualitative methodologies and to undertake a long-term study in which rigorous quantitative and quantitative data analysis would be implemented.

Chapter 3: Research Design and Methodology

3.1 Study Design

An intervention study with a pre-test /multiple post-test design was undertaken. All schools and grade 10 classes in Wentworth were selected for the study. Schools were randomly assigned to intervention and control groups. The study included an initial descriptive phase in which teachers were interviewed and focus groups were held with learners, followed by an analytical component in which questionnaires had to be completed by learners. The total study period was 14 months. Three schools were thus evaluated across four time points. The study design was innovative as it initially had two intervention groups and one control group between the first and second time points at which questionnaires were administered. The second intervention was implemented in one school only followed by a third administration of the questionnaire to all schools. The design allowed a time lapse of seven months with no intervention before a fourth questionnaire was further administered to all schools. As such the study looked at the effects of exposure to one intervention (at Time 2), a second intervention (at Time 3) and no interventions (at Time 4). The theory-based intervention adapted from the B.A.R.T. curriculum (St. Lawrence *et al.*, 1995) was designed and implemented by the researcher (a registered clinical socialworker), to incorporate relevant cultural and contextual issues of the South African society.

Further, the study was undertaken in three phases, namely: 1. The Preparatory Phase: (Training of volunteers, pilot questionnaire, focus groups with learners and teachers'

interviews), 2. The Implementation Phase: (The implementation of intervention 1 and intervention 2) and 3. The Evaluation Phase: (Process and impact evaluations).

The design included non-equivalent group sizes and a control group and allowed one to determine the relative effectiveness of different interventions. Schultz and Grims (2002) endorse unequal sample sizes in groups and emphasizes that forcing equal group sizes is unscientific. The presence of a non-intervention control group permits one to determine the absolute effectiveness of each intervention compared to the effectiveness of no intervention at all (Fisher and Forfeit, 2002). Non-randomized intervention studies that include a control group and pre-and post-intervention assessments are regarded as one of the most internally valid of the quasi-experimental designs (Cook and Campbell, 1979). The intervention design was theoretically based, which is well documented as being most effective in increasing knowledge, attitudes, beliefs and self-efficacy levels and promoting protective behavioural outcomes (Kim *et al.*, 1997; Speizer *et al.*, 2003; Robin *et al.*, 2004; James *et al.*, 2005).

3.2 Study Area

The area chosen for the study was Wentworth, a residential, urban area of southern KwaZulu-Natal, fifteen minutes travelling time from Durban (Appendix 1, p270). Wentworth has extensive commercial and industrial sites, together with residential areas, characterized by conventional construction. Further, the environment has hazardous industrial and residential pollution which encroaches into the Bluff Nature Reserve. Austerville and Wentworth merge into each other (eThekweni Municipality, 2004). The Wentworth community was previously

predominantly a Coloured community as defined by the old apartheid system of group classification in South Africa^{*}. With the change in the political environment of South Africa, the community of Wentworth has seen population changes, including the flow of mainly Black learners into the area, in the hope of receiving better schooling compared to the township schools. Thus, the school community included learners from Wentworth, Umlazi, Lamontville and Umbumbulu, among other areas. Wentworth is the immediate catchment area of Wentworth Hospital, as of the 1 November 2004, when it became a district health facility. The hospital was therefore tasked to serve the community, at an institutional and community level. The researcher who has worked in Wentworth Hospital for the past eighteen years undertook this project to orientate the community to the availability and accessibility of health services of the hospital. Further, the community of Wentworth was chosen, in order to provide a closer analysis of the sub-populations and the mix of racial groups at the high schools. In addition, issues of equity in prevention and care services in post democratic South Africa, the burden of infection and access to care and intervention, are experienced differently in different sub-populations in southern Africa, and therefore required analysis. Further, the AIDS prevention intervention is a proactive approach to health care and this project was encouraged by the Wentworth Hospital Management.

3.2.1 Motivation to Use Schools as the Study Area

The school provides a unique opportunity to reach a large segment of the adolescent population with HIV risk reduction messages, as the learners were legally mandated to be in

^{*} Group Areas Act No 41 of 1950

school (Jemmott and Jemmott, 2000). Schools provide an established venue for interventions, as they are linked to communities, thereby enhancing ownership of the interventions (Gallant and Maticka–Tyndale, 2004). Further, studies have reported that most learners in sub-Saharan Africa initiate sexual activity while they are still in school (Kaaya *et al.*, 2002). School-based interventions are also single locations where the largest proportion of young people can be reached (Gallant and Maticka–Tyndale, 2004). Learners could therefore be reached before they became sexually active (Stewart *et al.*, 2001). The school is also an important institution in the learners' lives and therefore school policies and programmes are essential to help learners cope with HIV/AIDS (Stewart *et al.*, 2001). Family Health International (2006) has recommended school-based programmes for the promotion of long-term positive behaviour outcomes (Kirby *et al.*, 2006b). Further, the World Health Organization reported that schools are well placed to achieve the ultimate goal of decreasing HIV prevalence among young people (Ross *et al.*, 2006).

3.3 Ethical Approval

Ethical clearance for this intervention study was obtained from the University of KwaZulu–Natal Medical School, Durban (*Ref.: H044/03*) (Appendix 2, p271). Permission to conduct the study was obtained from the KwaZulu–Natal Department of Education (Appendix 3, p272) and written permission was obtained from each school principal (Appendix 4, p273). Written informed consent was obtained from all parents and learners separately (Appendix 5, p276) (Appendix 6, p277).

3.4. Sample

The sample included all Grade 10 learners from all three high schools. The sample is described in more detail in the results chapters following.

3.5. Allocation of Intervention and Control Schools

The schools were randomly allocated to intervention and control groups thereby reducing the likelihood of 'contamination' of the control group (Farmer and Lawrenson, 2004). Two schools were therefore randomly assigned as intervention schools and one school was the control school. The randomization was done by drawing out of a hat.

3.6. Study Instruments

The study instruments included the interview schedule for focus group discussions (Appendix 8, p278), the interview schedule for teacher interviews (Appendix 9, p279) and the questionnaire (Appendix 10, p280).

3.7. The Intervention: Be A Responsible Teenager (B.A.R.T)

The B.A.R.T. intervention was implemented in February 2004 and completed in April 2005.

The South African B.A.R.T. intervention was extended from the original eight sessions to include ten sessions between T1 and T2 and an additional two sessions from T2 to T3. The intervention was called the B.A.R.T. (Be A Responsible Teenager) programme which was based on a Social Cognitive Theoretical framework (St. Lawrence *et al.*, 1995). It has further been recommended by The Centre for Disease Control (Centre for Disease Control, 1999).

The sessions included information, motivation and skills building exercises and was adjusted to include sessions that were culturally sensitive and developmentally appropriate (Jemmott *et*

al., 1999). For example 'Voluntary Counselling and Testing' was discussed together with South African rape protocols, procedures and statistics. Learners were informed about how to access these services, how to empower themselves through prevention skills, and the relationship between forced sex and HIV/AIDS. Sessions involved group discussions, a locally produced video*, games and role–plays. A brief outline of the sessions is included below:

3.7.1 Intervention 1

Session 1: What is B.A.R.T.? Ground rules, group expectations, goals, definitions– HIV/AIDS/STIs; How the immune system works and how HIV infects the body. Pictorial review of STIs.

Session 2: To believe or not to believe! Beliefs about HIV/AIDS– group work (card game with belief cards), current HIV statistics, pictorial discussion of how AIDS is transmitted, modes of transmission, personal traffic lights, AIDS buster game

Session 3: 'No Apologies Video' Video presentation on abstinence

Session 4: Bring out the condoms! Fact sheet, skills exercise, feelings about using them.

Session 5: Communication skills: let it role! Assertiveness steps through role plays and modelling.

Session 6: Refusal skills: The 'Be Smart' principle: Modelling, role play and tips to delay sex.

Session 7: Personalize the risk! HIV positive speaker presentation.

* 'No Apologies' video

Session 8: Rape: Persuasion skills, modelling and role play, myth and facts on rape, rape protocol, minimizing risk of rape, the use of alcohol and drugs and rape.

Session 9: Personal inventory: VCT– How to get tested. The meaning of the test, types of tests.

Session 10: Making responsible choices: Goal setting, choices, what is responsible sexual behaviour, planning for the future.

3.7.2 Intervention 2

The additional intervention included two sessions whereby NGOs working in AIDS prevention did presentations to motivate learners on the realities of HIV/AIDS.

Session 11: The NGO ‘Walk for Life’ spoke about abstinence and high abstinence as keys to AIDS prevention. Learners from different communities related personal motivational experiences and challenged learners to sign up for future walks for abstinence.

Session 12: The NGO ‘Bobby Bear’ did a presentation on the realities of sexual violence and AIDS. Through the medium of puppetry, the transmission of HIV was related. Further, protocols and legal processes on sexual violence and rape were presented to learners as a preventative strategy and in view of the high incidence of rape in South African society.

3.7.3. Adaptability of the Intervention

The B.A.R.T. intervention was originally used in an after-school setting among African American youth by St Lawrence *et al.*, (1995), however it has been subsequently adapted for use in a residential setting (Butt & Hartman., 2002), among a population of at-risk Haitian youth (Malow *et al.*, 2004), among high-risk youths in adjudicated and detained facilities and alternative high schools (Polacek *et al.*, 2008) and among high-risk female adolescents in a foster care setting (McGuinness *et al.*, 2002). Various HIV prevention curricula including B.A.R.T. were reviewed by the US Department of Health and Human Services (Solmstead; 2007). It elaborates that although it is recommended for after-school programs it is still presented in a classroom setting. The overall goals include providing essential information about HIV/AIDS; teaching ways to handle social and sexual pressures and ways to communicate assertively with friends and potential sexual partners; and training in refusal, negotiation and condom use skills. Therefore whether it is held during school or after school, whether it is open to the community or held in different settings among different population groups the curriculum is adaptable and is listed as one of the best practice models for HIV prevention by the Centre for Disease Control (CDC; 2002). Many researchers are however reluctant to apply western interventions in different cultural settings as they argue that the basic formative and ethnographic work and the development of culture specific interventions are necessary (Fitzgerald *et al.*, 1999).

In the adaptation, however, the implementation of these activities was tailored to be appropriate to the cultural values, beliefs, current social problems such as sexual violence,

teenage pregnancy as they relate to HIV transmission. The cultural adaptation of B.A.R.T. in the HIV prevention intervention of this study, can be viewed as an integrative strategy, primarily because of the involvement of the target population in the development of the intervention and the use of community based organizations as a base for recruitment of personnel to participate in the delivery of the intervention. Input from several sources including the community, the target high school population and research literature was obtained. Thus the researcher's adaptation was guided by a) information from focus groups conducted with high school learners in the study schools. b) Further indepth interviews were conducted with teachers on their current process of implementation of the HIV/AIDS Life Skills' programme and c) the problems they experienced in schools. Further community practitioners serving in youth groups, clinics and AIDS organizations were interviewed. School principals were also interviewed informally on the applicability of the programme to learners. Themes that emerged from the focus group dicussions and informal and formal dicussions were identified and included in the B.A.R.T. curriculum, after analysis of the programme. Revisions were made and the final curriculum was developed. More specifically, examples of beliefs and attitudes derived from the focus groups were included in the study. Further as violence in relationships through coercive sex is highly prevalent in South Africa, a session on rape and HIV was included, one on child abuse and HIV and one on voluntary counselling and testing. Learners were informed about how to access services, how to empower themselves through prevention skills and the relationship between forced sex and HIV/AIDS. The video used for the study was a South African video about teenagers talking about their belief systems regarding abstinence, coercive sex, condom use, etc. The motivational speakers included South African youth and people living with HIV/AIDS. The rationale used to adapt the intervention so that it was culturally sensitive and developmentally

appropriate was derived from the hands on experience of the researcher who is a clinical social worker in the Wentworth community. She was able to identify problems among youth through practical experiences with them. The B.A.R.T. curriculum was simple to understand and therefore developmentally appropriate. As the researcher coordinated all the sessions she was able to adapt the sessions to suit the level of understanding of the learners without changing the content of the curriculum.

The urgency of the epidemic and the magnitude of the spread of HIV especially among youth in South Africa, together with the high costs involved in the development of new behavioural interventions led the researcher to opt for a recommended US based intervention which addressed factors she has encountered as a clinical social worker in Wentworth Hospital. Some of these areas included the increase in mortality due to AIDS related illnesses among youth and in an increase in incidences of abuse, parasuicides, domestic violence, stigmatization and victimization due to HIV/AIDS. In support of this, other researchers have also reported on the successful use of western-based HIV risk-reduction interventions among adolescents in an African setting (Fitzgerald *et al.*, 1999). Fishbein (2000) further confirms that 'northern theories' when adjusted to local context, can produce effective programmes.

3.8. Procedure

The Precede–Proceed Model (Green and Kreuter, 1991) explains the process of this study. The Precede framework directs the planner to begin the planning process by examining the

outcomes and then the inputs. By beginning with the desired outcome one can focus on the causes of it and what one must do to precede the outcome (Green and Kreuter, 1991). In this project the desired outcomes focused on behaviour change of risky sexual behaviour with the final outcome being AIDS prevention. In the preparatory phase focus group discussions were held with learners, teachers were interviewed, the questionnaire and the intervention was pilot tested, the questionnaire was developed after an extensive literature review of school-based studies and the facilitators were trained. This preparatory phase will be outlined in the results chapters 4 and 5. The implementation phase and the process evaluation follows below respectively.

3.8.1. Pre-Test: T1

The learners were briefed about the nature of the study and the coding system by the researcher. Confidentiality and anonymity was explained and assured. Questionnaires were coded against the class registers so there were no names on questionnaires. Self-reported questionnaires were subsequently issued to learners during the class period in all three high schools. The researcher together with facilitators assisted in the administration of questionnaires (Appendix 10, p280).

3.8.2. Intervention 1

The B.A.R.T. intervention was implemented by the researcher with the assistance of trained facilitators.

3.8.3. Post Intervention: T2

The effects of the intervention were assessed using the same pre-test questionnaire.

3.8.4. Intervention 2

The school that received the second intervention was selected randomly. The second intervention ran for a further two weeks, while the other two schools received no intervention.

3.8.5. Re-evaluation: T3

Learners from all three schools were evaluated again using the pre-test questionnaire.

3.8.6. No intervention period

There was a no intervention period of seven months from September 2004 to April 2005.

3.8.7. Re-evaluation: T4

Learners were re-evaluated after this period of no intervention using the same questionnaire, to assess whether any positive effects of the intervention were sustained over time.

3.8.8. Process Evaluation

The Department of Education approved of the intervention and this engaged the support of the principals and school governing bodies. The management of Wentworth Hospital, at the time of the project was very supportive of the programme and financed the initial cost of stationery. The Precede Phase included the social diagnosis and the educational and organizational diagnosis. The latter diagnosis examined predisposing factors, reinforcing factors, enabling factors and administration and policy diagnosis. To ensure the fidelity of intervention delivery, facilitators completed standardized training, used structured intervention protocols, met on a weekly basis with clinical and task supervisors, and received routine monitoring and feedback from the on-site supervisor.

3.8.8.1. Pilot Study of Questionnaire and Intervention

The questionnaire was piloted in a high school outside of the area of the intervention. The purpose of the project was outlined to learners. Questionnaires were completed in a class period by a total of fifty learners. The researcher subsequently analyzed each question for clarity and question appropriateness and adjusted the final instrument so that the original meaning of the question was not lost. Questions that were ambiguous or repeated were excluded from the questionnaire. Verification of the language of questions was made clear through translation of incorrectly worded statements to ensure that the correct meaning was conveyed. The study questionnaire was based on standardized questionnaires which increases comparability of data across different populations and geographic areas (Amon *et al.*, 2000). The use of standardized questionnaires has many advantages. Firstly questionnaire development is a difficult process and these instruments contain formulation of questions and time references which have been tested and are known to produce high-quality data (Amon *et al.*, 2000). As these instruments have been used in numerous settings throughout the world their continued use will allow behavioural surveillance results to be compared internationally (Amon *et al.*, 2000).

In addition to piloting the questionnaire the intervention was pilot tested among a group of twenty of these learners according to the programme described. The intervention was subsequently adjusted to keep with the time frames of the class periods and to allow the learners to change classes. The content of the intervention sessions remained the same at each

of the schools. The researcher who an experienced group therapist coordinated and was presented at all sessions. She was able to steer the intervention to ensure fidelity in terms of implementation. The intervention was therefore delivered in a standardised format to all intervention schools.

3.8.8.2. Training of Facilitators

Youth volunteers from a Wentworth NGO called W.A.A.G. (Wentworth AIDS Action Group) were recruited to assist as programme facilitators. Five female facilitators were trained over a three day period. The facilitators ranged in ages from 19 to 50 years of age. The cognitive behavioural intervention (B.A.R.T.) was introduced to facilitators. Facilitators were trained through a participatory approach to B.A.R.T. sessions.

3.8.8.3. The School Staff

The school management played a major role in the implementation of the programme. Some principals allocated a teacher to coordinate the organization of the research programme with the researcher. Both intervention schools had supportive school coordinators. In the control school the principal was difficult to deal with and negotiation of a time table was problematic. Therefore the management of the school played an important role in the input the learners received on AIDS prevention. The supportive school environments in organizing sessions and timetables to meet the programme requirements were reinforcing factors. Generally teachers welcomed learners' exposure to the new material that the programme presented. Teachers identified the increasing incidence of pregnancy among learners as well as learner drop outs, as problems affecting the learning process. There were also concerns about the lack of

accessible professional counselling services to learners. Teachers reported that the duration of teaching on HIV/AIDS was different between teachers and schools, which indicated that all learners did not receive the same standard and length of HIV/AIDS education.

3.8.8.4. The School Environment

Sessions were conducted in the school hall which was airy and comfortable. Teachers remained in classes while learners moved around the school for different subjects, which decreased the time period allocated for the sessions. There was a shortage of chairs in the school hall and learners had to sit on tables or the floor. Acoustics was a problem in one school as the hall was too big and instructions could not be heard clearly. A mike system was subsequently used to facilitate this process. In addition one school did not have a hall to facilitate the sessions which had to be undertaken in congested classrooms.

The large numbers of learners in the sessions made it difficult to assign a facilitator to every group. In most sessions only three facilitators were available, including the researcher. With larger class sizes more groups had to be formed, which sometimes made it difficult to exercise effective monitoring and discipline of rowdy learners.

3.8.8.5. The Learners

Learners from different socio-economic backgrounds attended the schools in Wentworth. Some learners had a desire to learn from the intervention programme while behavioural and discipline problems were evident in others. Some learners behaved in ways to disrupt lessons so that they would be asked to leave the class. In some cases instructions given to learners were not followed. Many boys frequently left sessions to go to the restroom, where they smoked throughout the class period or walked around the school. There was no system in

place to discipline these learners. Learners also played card games, marbles and money games during sessions and had to be frequently reprimanded to focus on the task assigned to them. Bringing weapons into the school also proved highly disruptive. In one session a learner presented a knife while learners were watching a movie, and the whole session was subsequently disrupted. A high absenteeism was noted among learners especially during bad weather and during the outbreak of conjunctivitis. Learners deliberately infected each other so as not to attend school. One school principal* reported a 20%-30% daily absenteeism at school which further reflects a lack of a culture of learning among learners.

The teachers reported that many learners left home daily under the pretence of going to school, but spend the day walking about in shops and flats in the community. There was a sense of lethargy and lack of interest amongst many learners. This attitude was evident in the daily long queues of late comers that the researcher observed at the school gates, long after the school session had begun.

There were also reports of learners who had criminal records for murder and other forms of violence and continued to display behaviour problems in the school environment. Many learners came from homes where there were many social problems. Learning was therefore not given priority but rather family conflict, alcohol abuse and physical and verbal abuse, took precedence in homes. Learners were highly exposed to HIV/AIDS knowledge, through school

* A.Bishop (personal communication, August 3, 2004).

programmes, television, radio, presentations made by outside agencies, participation in peer educational programmes and in the school Life Orientation curriculum. Learners felt they had heard too much about AIDS. Knowledge about identifying STIs like gonorrhoea was limited, as learners asked questions about yellowish discharges that would not go away. The learners were receptive to an outsider implementing a programme at their schools, as a break from the routine of the school periods.

3.8.8.6. Class Room Sizes

Sizes of classes in all schools were generally large, i.e. between 40-50 learners. The technical classes were generally smaller in size (i.e. 30+) and were dominated by boys.

3.8.8.7. The Group Sessions of the Intervention

The sessions had to be incorporated into the school curriculum and hence were limited to the length of a class period, which was 40/45 minutes. This time period was sometimes not adequate to complete the task assigned. Learners sometimes sat in circles and engaged in exercises while facilitators supervised them. During role-play sessions learners were paired or grouped into fours depending on the class numbers and subsequently appointed one person to feedback to the rest of the group.

The researcher implemented the programme between schools by holding each session on different days of the week for different classes at different schools. The researcher organized and administered the programme through telephonic contacts, faxes, personal interviews and regular liaison with teachers and NGOs. Time tables for the project had to be drawn in

keeping with the school timetable and the researcher had to select periods that did not clash with class sessions. The timetables had to be co-ordinated between schools. In addition time tables had to consider school holidays and exams. The researcher also had to ensure through regular contacts, that the facilitators were available for each session. Equipment such as the flip chart had to be borrowed from the hospital and taken to each school on the assigned days. The researcher had to ensure that adequate printed material was available for group discussion, role-plays and skills workshops. For the movie session she had to ensure that each school had the equipment in place prior to the sessions. Liaison with the NGOs to present sessions on child abuse and abstinence had to be done through written correspondence months before the date scheduled by the school. This had to be followed by regular telephonic contacts. Additional chairs had to be obtained. Further, the video equipment had to be checked as some equipment did not work. When using the school overhead projector the screen was of a poor quality and hence learners could not see the information. In some cases the wall had to be used to project. The administration of the questionnaires involved coordination with the school time tables and facilitators to implement the process per class. In the initial baseline analysis all learners sat together in the hall and completed the questionnaire. This was very chaotic, together with the poor sound and learners' reluctance to complete the questionnaires.

3.8.8.8. The Intervention

The implementation phase consisted of the implementation of the B.A.R.T. curriculum. The intervention was accepted with enthusiasm by many learners, despite discipline problems. Learners appeared to enjoy the interaction of sessions, the input from NGOs, the video, the group discussions and role-plays. Subsequently two further sessions were held at one of the intervention schools.

3.8.8.9. Lost to Follow-Up

At the end of T3, many learners had left school as it was the end of the year and some may have failed and therefore did not return to Grade 11, when the time 4 assessments were undertaken. Some learners transferred to other schools while others dropped out of the school system altogether.

3.8.8.10. Questionnaire Completion

Learners completed the questionnaires while they sat at their class desks or in the hall.

Learners covered their responses so others could not see answers. This prevented copying and promoted privacy. In addition facilitators were present to prevent copying of responses. Many learners who completed the questionnaires at T1 did not complete the questionnaire in T2 or T3 or T4. Further learners entered and exited the study at different periods. A large proportion of learners returned blank questionnaires with comments, indicating that they were bored with the repeated questionnaires. Some of these comments included, 'I am sick and tired of completing this form', 'I hope this is the last', 'stop asking me the same questions over and over again'. Graffiti was a familiar sight on questionnaires. One learner drew a door, cut it out and wrote – 'open the door and the man inside will tell you the answers'. The questionnaire was blank. Pages were torn and dug out in many questionnaires. A sense of apathy was noted among learners in the questionnaire completion process.

3.8.8.11. Report Back to Schools

The intervention was made available to the control school on completion of the study. In addition summaries of research findings were posted to all schools. The researcher has

maintained contact with the schools through telephonic contacts and with continuous consultancy with teachers on health issues and, social and behavioural problems of learners.

Table 3. Summary of the Stages, Design, Purpose, Instruments and Analysis of the Study

Phase	Study Design	Purpose	Study Instruments	Analysis		
I Preparation	Descriptive	To pilot the questionnaire and intervention	Structured questionnaire & B.A.R.T. intervention	-		
	Descriptive	To evaluate teachers' perspectives.	Interview schedule	Qualitative & Themes		
	Descriptive	Training of Facilitators on intervention	B.A.R.T. intervention summary	-		
	Cross Sectional Descriptive	To assess learners behaviour, risk factors & determinants of sexual behaviour	Interview schedule for focus groups Structured questionnaire piloted at school	Qualitative & Themes Quantitative, Univariate analysis		
II Implementation	Pre-Post Longitudinal	Implemented behavioural intervention in 2 schools Implemented behavioural intervention in 1 school	Self administered questionnaires completed- <ul style="list-style-type: none"> • at Baseline (T1), • at T2 (4 months later), • at T3 (7 months after baseline) and • At T4 (14 months after baseline). 	Univariate & Bivariate analysis at T1, T2, T3 & T4, using Chi-square and ANOVA		
III Evaluation						
		1. Process	Descriptive	The school, the environment, the learners, etc.	Direct observations by the researcher	Qualitative & Themes
		2. Impact	Baseline/Pre/Post: One interventions Two interventions	To evaluate factors & determinants of sexual behaviour	Self- administered Questionnaire evaluation	GEE & Logistic Regression Models

3.9. Data Collection

Learners were asked to complete all questions on the questionnaire as honestly as possible within the time assigned. Informed consent was obtained and confidentiality was assured.

3.10. Reliability and Validity: Self Reported Measures

The instrument used for this study relied upon self-reported measures. Much of what is known and published about adolescent behaviour derives from self-reported measures, especially in the area of sexuality (Siegel *et al.*, 1998). Studies have shown that data from self-reported questionnaires are likely to be more valid than those obtained from face-to-face interviews because a greater sense of confidentiality may reduce social desirability bias (Ajuwon *et al.*, 2006). Coding was reported to increase the accuracy of self-reporting (Jemmott *et al.*, 1992a). Sexual risk behaviour is itself private behaviour; and consequently has to be assessed with self-reported measures (Jemmott *et al.*, 1992a). Each questionnaire was coded in conjunction with the class registers, so that the learner could be identified by the researcher only. No names were allowed to be entered on the questionnaire. The numbers were written on the questionnaire together with a separate slip containing the name of the learner. Learners were asked to remove the slip with their names when handing it in.

Many factors however influence the likelihood of obtaining accurate information and the validity of data. These factors include, the degree to which the subjects felt they could be identified (anonymity vs. confidentiality vs. no measures for protection of privacy); the intrinsic ability of the respondent to be honest together with the nature of the information

requested in terms of personal sensitivity and belief about possible sanctions or punishment if truthful (Siegel *et al.*, 1998). Siegel *et al.*, (1998) used a self administered questionnaire to measure the overall honesty of high school learners in respect to sexual honesty. They reported high levels of honesty together with some over-reported and some under-reported behaviour, which did not invalidate interpretation of the overall survey findings. Similarly, among Nigerian learners males may have over-reported their sexual activity and females under-reported sexual activities in order to conform to the religious and cultural norms affecting sex in this area (Ajuwon *et al.*, 2006). Siegel *et al.*, (1998) therefore recommended that estimates of response validity can be made by using repeated tests of the same questions separated by a period of time (test– retest), as has been the design of this study.

3.11. Reduction of Bias

Several aspects of the methodology aimed to reduce the possibility of inaccurate results, including requiring recall over a relatively short period, using coded numbers instead of names on questionnaires, emphasizing the confidentiality of responses and stressing the importance of truthful responses, in terms of planning health interventions for learners in South Africa. Validity was further increased as the researcher led the facilitation of all the intervention sessions thereby ensuring that the content and style of the intervention could not be a confounding factor in the analysis. The schools included in this study were geographically separated from one another. Therefore the events of one school were unlikely to have influenced the responses of learners at another school. Further the same trained facilitators were involved from the onset of the project to the completion in facilitating sessions and in questionnaire administration. The study further included a control group (Schultz and Grims,

2002), used validated survey instruments, and adapted material and methods to the South African context. Although the study was undertaken in one community in South Africa, the results may be generalizable to learners from other schools in the country as the sample included many learners from outside of the Wentworth community, who commuted between surrounding areas and Wentworth daily.

3.12. Missing Data

Missing data was evident in this study as outlined in the drop-out analysis. Data was excluded when questionnaires were incomplete. Further learners that were absent from school also prevented a more accurate data analysis. This causes the usual statistical analysis to be subject to bias (Shih, 2002; Farmer and Lawrenson, 2004). In longitudinal studies however missing data is almost always evident. The self-completed method of data collection typically has been reported to yield lower response rates and more missing data than face-to-face methods (Siegel *et al.*, 1998). Despite efforts to ensure confidentiality many learners may have been sceptical about what would be done with the data collected, and hence many removed the coding from the questionnaire, which invalidated the data. Missing data increased over time with the high drop-out rate of learners that exited the study at different points in time. This was in keeping with teacher reports of high daily absenteeism among learners. The attendance of learners was arbitrary so follow-up on missing learners was not feasible. Those learners who were lost to follow-up may have left the study, and therefore may have had different outcomes than those who were included in the final analysis. An analysis of the baseline characteristics of the missing learners was undertaken in this study.

3.13. Data Management & Analysis

Qualitative and quantitative data analysis was undertaken in this study. The qualitative analysis is elaborated in the chapters 4 and 5, while the quantitative analysis was reported in chapters 6 and 7. In the quantitative data analysis SPSS version 13.0 was used for data entry and quantitative analysis. Stata version 9 was also used for the longitudinal analysis. A cluster sample of all schools in the Wentworth area was undertaken and therefore the design effect was not relevant. As all schools were included in the study, the school was a proxy for control and intervention groups. Baseline differences were found and were controlled for in the analysis. A P value of <0.05 was considered as statistically significant. More details of the data analysis are outlined in the following chapters.

4. Results

In the following chapters the results are presented in keeping with the key objectives and hypothesis of the study.

Chapter 4. Focus Group Discussions

Chapter 5. Teacher Interviews

Chapter 6. Baseline Study

A. Sexual Risk Behaviours at Baseline

B. The Determinants of Sexual Behaviours at Baseline

Chapter 7. Impact Evaluation

Chapter 8. Limitations

Chapter 9. Conclusion & Recommendations.

Chapter 4: Focus Group Discussion with Learners

The focus group discussions among learners formed a key component to the preparatory phase of the study. Researchers have confirmed the benefits of focus groups. They enable the establishment of the needs of the children and staff, in order to define more clearly what should be the content of the programme (Kaufman *et al.*, 2002). They further allow one to elicit unprompted population specific levels of AIDS–prevention knowledge, in which individuals discussed their beliefs about prevention of HIV/AIDS, transmission and prevention and identified group specific knowledge deficits (Fisher and Fisher, 1992). An intervention can then be constructed to teach relevant information that was lacking (Fisher and Fisher, 1992).

4.1. Methodology

4.1.1. Sample

In this study six focus group discussions (FGDs) were conducted with 48 learners from Grades eight to eleven from the study schools. There were about eight learners of both sexes, in each of the sessions. The learners ranged in ages from 14 years to 18 years.

4.1.2. Instrument

The interview schedule for FGDs with learners consisted of five broad questions (Appendix 8, p278). The questions included beliefs and attitudes about AIDS, feelings about abstinence until marriage, feelings about condom use and having multiple sexual partners.

4.1.3. Procedure

Focus group discussions were conducted by the researcher. An interview schedule was used which consisted of open-ended questions on beliefs and attitudes about HIV/AIDS prevention, feelings about HIV, abstinence until marriage, condom use and multiple sexual partners. The learners were selected by the Life Orientation teachers for these sessions. The teachers were familiar with the learners and therefore identified those that were competent to voice their opinions about issues. The discussions were held on the school premises in a separate classroom away from other learners. The participants were arranged in a circle so that they could see each other and the facilitator could respond to individuals promptly. The researcher introduced herself as being a social worker from Wentworth Hospital and outlined the purpose of the group sessions. She began with informal general discussions to encourage participants to feel comfortable in the group. The purpose of the focus group discussions was explained in terms of the researcher implementing a HIV/AIDS prevention programme in schools. The need for ground rules was established and the researcher encouraged all participants to respect confidentiality of the group discussions. All learners were competent in English and the researcher therefore conducted sessions in English. The researcher is a professional group therapist and therefore was highly competent in the group process. The researcher was assisted by a facilitator, who was a community member, who assured confidentiality. Both group leaders took notes of learners' responses.

4.1.4. Data Analysis

After the 45 minute group sessions the facilitator and the researcher discussed the learner's responses and summarized them accordingly. Written records of focus group discussions were

kept and the researcher analyzed these responses further according to the broad themes presented. In the subsequent sessions the researcher and the facilitators held indepth discussions on the learners' attitudes, beliefs, etc. and sexual behaviour practices evident from the discussions. These assisted the researcher in understanding the population of learners under study. The participants did not require debriefing as the focus group discussions did not invoke any trauma or emotional concerns.

4.2. Results

Learners held both positive and negative beliefs about AIDS. They had a good knowledge of HIV/AIDS and the process of transmission, but held many false beliefs about their personal risk of infection. Learners felt that kissing could spread HIV and were not keen on sharing utensils with HIV positive relatives or learners. Some male learners recognized that having many partners placed them at risk for HIV, but felt that as men they needed to be sexually experienced by experimenting with many partners. They described the joys of multiple partners as an experience of 'seeing which rose was the sweetest'. Female learners on the other hand preferred to be committed to one partner. Generally learners heard a lot about AIDS, were afraid of getting it, and some learners stigmatized HIV infected people while others were empathetic to people with AIDS. They described personal experiences with family members who were dying of AIDS in their neighbourhoods. There were mixed responses about abstinence from sex until marriage. Some learners with strong religious beliefs felt abstinence until marriage was the best option, while others said that they would engage in protective sex as it was not possible to wait until marriage to have sex.

Condom use was favoured by learners but many did not trust condom reliability. Learners reported that condoms had broken during sexual intercourse, so they feared using them. Some learners did not know how to use condoms and from where to access them. Others felt that the free condoms were not good enough as they had a bad smell, and therefore preferred buying more attractive condoms.

4.3. Discussion

Some of the key themes that were evident from the focus group discussions were that the different sexes provided different responses to protective and at risk behaviours. Males were prepared to take the risk of becoming HIV infected and held values of being sexually promiscuous as a necessity for their manhood. Females valued religious values and were committed to being faithful to one partner. Males did not think it was possible to commit to abstinence until marriage while females were more inclined to opt for abstinence. Both males and females reported experiences with family and friends who had died of AIDS, however personal risk perception was low for many learners. Similarly James *et al.*, (2004) reported on the gap between awareness and behaviour among high school learners in South Africa. Amongst both males and females there were learners who were not familiar with how to use a condom nor where to access them. There was a perception that the free condoms were of a poor quality.

4.4. Conclusions

The focus group discussions identified gaps in beliefs and attitudes of learners together with gender differences in responses to protective and risky sexual behaviour choices. Abstinence, being faithful and condomising were options that these learners did not consider, as personal risk perception was low. Given these findings there was an urgent need to implement a HIV/AIDS prevention intervention among these learners. Most learners were comfortable and spoke openly about their practices and beliefs, however some members may not have responded honestly as they may have been intimidated by the group process and feared being ridiculed by their classmates after the sessions.

In addition to focus group discussions teacher evaluations formed an important phase of the preparatory phase of the study.

Chapter 5: Teacher Interviews

Objective 1: To evaluate the current practice of Life Skills'' education with specific reference to HIV/AIDS, from the teacher's perspective.

In keeping with the Precede-Proceed Model (Green & Kreuter, 1991) the social diagnosis phase of the study included assessing the general concerns of the population under study through formal and informal interview processes. Interviews with teachers were an integral part of this process in order to understand the context of learning and the implementation of the Life Skill HIV/AIDS Programme (LHAP)

5.1. Methodology

5.1.1. Sample

The sample consisted of teachers who were currently teaching Life Orientation (LO). They were randomly selected from all schools. The teachers' ages ranged from 25 to over 50 years and comprised four males and seven female teachers ($n = 11$). The total number of teachers that taught Life Orientation in grade 10 was $N = 15$, but not all teachers were available for the interviews. All teachers were able to communicate fluently in English.

5.1.2. Instrument

A semi-structured questionnaire (Appendix 9, p279) on the Life Skills' curriculum, skills of trainees, type of training received and shortfalls formed the basis of the interview. The questionnaire included sixteen questions on: Involvement in Life Skills' training, the type of

training they received in HIV/AIDS and Life Orientation (LO) especially by the Department of Education, other personal training in HIV/AIDS, areas on which they lacked information in terms of HIV/AIDS education, curriculum details, the amount of time allocated to HIV/AIDS education, feelings about behaviour change and the curriculum, exploration of audiovisual equipment, teaching methods that were effective to teach HIV/AIDS education, the number of learners to whom they taught HIV/AIDS LO and the comfort levels in the classroom, problems in implementing the LO programme, suggestions to improve the HIV/AIDS curriculum, access to counselling for learners and other comments.

5.1.3. Procedure

Interviews were conducted individually with teachers at the study schools during the teacher's free periods and after school. The researcher conducted the face to face interviews which lasted for the duration of about half an hour. The purpose of the interview was explained in terms of the research study. Teachers were encouraged to speak openly about the LHAP. The researcher informed them that the findings would be reported to the relevant departments at the conclusion of the study however anonymity in responses and schools would be maintained.

5.1.4. Data Analysis

Written responses were recorded by the researcher during the interview process. Data from each teacher was analyzed according to common and different themes reported in the interviews.

5.2. Results

The following responses were recorded:

5.2.1. Period of Involvement in Life Skills' Training

Teachers reported that they had taught Life Skills' between one to four years. The teachers that were teaching LHAP for the first time felt that they had a lot to learn about this new curriculum, while teachers who had been longer in the programme displayed a higher level of confidence. Three teachers had been guidance counsellors previously and hence had taught guidance to all Grades for many years before Life Skills' was introduced.

5.2.2. Teacher's Training in Life Skills'

Two teachers from two different schools had received training in a one day workshop by the Department of Education, one teacher was trained by the AIDS Information and Training Centre, one teacher had been to a four day workshop run by the Department of Education, while others had no training at all and relied on feedback from their colleagues, usually the Head of Department. For the majority of teachers, the LHAP subjects were new and they had to rely on general knowledge and books. Teachers did receive some manuals from the Department of Education, but these provided inadequate information, and many supplemented information.

5.2.3. Responses to the Department of Education Training

There was a general agreement that the training by the Department of Education was of a sub-standard level. The course communicated mostly knowledge on HIV/AIDS and positive living. Training was outsourced by the Department but there was no monitoring and

evaluation of this training. Some teachers reported that the trainer appointed by the Department of Education, was also not punctual and further, made errors in basic spelling further substantiating the substandard nature of the training.

5.2.4. Gaps in Life Orientation Education and Teaching methods

Many teachers reported that they were uncomfortable talking about condoms and sex. They felt that learners did not believe teachers about the seriousness of HIV, and therefore health personnel and social workers would be received better. Teachers chose areas that they were comfortable to talking about and excluded other topics that caused embarrassment. For example, condom use had to be demonstrated with the use of a visual aid, like a cucumber or banana. Anal sex and oral sex were also areas that caused great discomfort. Personal discomfort in discussing sexually explicit material was a problematic area as learners challenged teachers especially on sexually explicit material. They felt confident to teach the theory of HIV/AIDS, but lacked the ability to counsel learners on their personal issues or with risk reduction strategies and to assist them if they themselves were HIV positive. Some teachers felt that they needed more visual aids and posters to teach HIV/AIDS. Visual aids included pictures and movies while teaching techniques included group work, worksheets, question and answers, case-study and report back. Visual aids had to be purchased from the school budget to facilitate lessons. Some schools were more resourceful than others and purchased material to make lessons more interesting, while others did not. Role-plays and group discussions were well accepted, though not frequently done due to lack of space.

5.2.5. Views on the HIV/AIDS Life Skills' Curriculum

Teachers generally followed the Department of Education guidelines. Their responses are reported below:

“There is no set curriculum. After the course we were promised a guide and booklets for learners but nothing has come, so we just use whatever information we get from non-governmental organizations”.

“We have to supplement the curriculum with our own materials from our school budget”.

“I use a LO textbook that includes Life Orientation and some material on HIV/AIDS. The department gave us a primary school curriculum, which we cannot use in high school”.

“I use the booklets given by the Department, they have also learner workbooks. I rely on general knowledge, media, and newspapers/magazines as well”.

“The WHO guidelines are being replaced by the revised curriculum which we will be implementing next year in 2004/5. We are supposed to use it as a guide and apply it to all areas of LO including HIV. I find that we do not have adequate time to complete all aspects in the current syllabus, so it is up to the teacher to select topics of interest”

“All teachers do not have the same material. One teacher usually goes for training and has a copy of materials which has to be circulated”

The HIV/AIDS curriculum of the Department of Education was thus perceived by most teachers to be inadequate. The methods of training and resources for teaching AIDS were poor. Teachers reported that there was minimal support and in some cases no support from the

Department of Education and gaps in the implementation of the HIV/AIDS Life Skills' curriculum was evident. Further the curriculum was created and rolled out, and then training was introduced without creating infrastructure and equipping teachers with adequate resources.

5.2.6. Amount of the Total LO Time Allocated to HIV/AIDS Education:

Of the total LO time, 20% was allocated to HIV/AIDS. Total time periods varied between schools and between teachers, from one week per term to four to ten hours for the year.

5.2.7. Life Skills' HIV/AIDS Programme (LHAP) and Behaviour Change

Teachers reported that many learners were experiencing the reality of AIDS in the townships and the information was therefore useful. However, it was an academic exercise and was examinable in Grade 8 and 9. From Grade 10 to 12, it was really left to the teacher to determine what they wanted to teach (in 2003/2004). In many cases it was a free period.

Learners further did not personalize the risk, which was evident as teachers reported high teen pregnancy rates in schools. Learners also required one to one counselling which many teachers could not give them, due to time constraints and lack of professional counselling skills. Many learners had a perception that "it won't happen to me" and therefore no behaviour change followed. From the teachers' interaction with learners on a personal basis, they reported that the Wentworth community was rampant with domestic violence, broken homes, alcohol and drug abuse, single parent families and poor socio-economic environments. These factors counteracted any positive impact that HIV/AIDS knowledge might have had. For example, learners openly discussed with their teachers that their social lives largely revolved around parties and substance abuse. Teachers felt that the demographics of this community needed to

be taken into account when looking at behaviour change. For learners to change their behaviour they needed to be exposed to people infected with the disease, which teachers felt they themselves were not adequately skilled to handle. Further teachers felt that teaching theory according to a curriculum could not produce behaviour change among learners as there was no link between theory and actual practice.

5.2.8. School Equipment

All schools had a video recorder and television, which were donated by the local industry, ENGEN. One school had a digital visual disc (DVD) player and another had a sound room with a projector. A few teachers were not aware of what equipment was in their schools nor had they used the equipment to supplement lessons. The teachers had to however obtain their own videos or DVDs, as these were not available in the school library. One school did not have a hall, while the other two schools that had halls, did not have adequate chairs to accommodate the entire Grade 10 class. Where chairs were lacking, learners were accommodated on tables, while others stood for the sessions, which created a disruptive teaching environment.

5.2.9. Numbers in LO class

Learner numbers ranged from 30 to 50 learners per class. Some teachers found it difficult to work with these numbers in congested spaces, thereby limiting teaching methods like skills' training using role-play. Many teachers found group work an effective tool with these large groups. The school hall was sometimes used, but if it was booked, learners had to have lessons outside. The lessons were often dependent on whether the weather was good or bad. These

practical concerns, together with the increase in learner–teacher ratio, therefore hindered the teaching of LHAP.

5.2.10. Suggestions on Improving the HIV/AIDS Part of the LO Curriculum

The creation of informal communication structures with parents and teachers was reported as an important step towards personalizing the risk of HIV. Health workers should play a role in mobilizing projects and programmes. Teachers also expressed fear that learners received too much HIV education and hence became desensitized to AIDS. Some said that the Department of Education should also take a more active role in supporting teachers with updated workshops and following up on problem areas including the provision of updated teaching material.

5.2.11. Availability of Counselling for Learners

The removal of guidance counsellors from schools placed an additional burden on teachers to undertake this task. Some schools had one teacher appointed to perform counselling in addition to all academic duties, while other schools had no counsellors. Further there were no set times on the time table for counselling and hence learners' access to the teacher depended on the teacher's schedule for the day. Therefore counselling for learners was not accessible, nor was a suitably qualified persons available for this purpose in most schools.

5.3. Discussion

Life Orientation comprises one of the eight learning areas in Curriculum 2005 and incorporates the areas of self–concept, emotional literacy, social competency and Life Skills';

deals with the realities of peer pressure, being a leader and a follower, being a parent, prevention of substance abuse, sexuality, teenage pregnancy, STIs and HIV/AIDS (Spady and Schlebush, 1999; Department of Education, 2004). From the above interviews with teachers, it was evident that gaps in teaching specifically the LHAP included poor school facilities, large learner–teacher ratio, inadequate training on the curriculum prior to implementation, incompetent trainers, lack of sensitizing teachers to sexually explicit information and a lack of access to professional counselling services for learners. Teacher comfort levels in discussing sexually explicit information, for example, using a cucumber or banana to demonstrate condom use was low. Some teachers overcame this problem by focusing on the academic aspects of HIV/AIDS while avoiding uncomfortable topics, to the detriment of learners. This finding is supported by Reddy and James (2001), who reported that among teachers in KwaZulu–Natal discomfort was experienced as learners questioned teachers on more details of sexual physiology (Reddy and James, 2001). Further, teachers in KwaZulu–Natal generally focused on the HIV/AIDS information rather than on Life Skills’, for example, caring for people with HIV/AIDS. In another study among learners in South Africa, less than a quarter of the respondents recalled having discussed all eight core Life Skills’ topics of the curriculum during their last year of school (Rutenberg, 2001). In addition the primary difficulty in implementing the LHAP was that sex education as health promotion should be intensively skills based and most teachers were not equipped to provide appropriate skills development without first developing their own skills (James *et al.*, 2006a).

Contrary to these findings in a study in Tanzania researchers found that it was feasible and effective to train local teachers and health workers to provide HIV/AIDS education to primary school learners. Statistically significant effects were reported in favour of the intervention group for AIDS knowledge, attitudes towards people with AIDS, subjective norms and intentions towards having sexual intercourse (Klepp *et al.*, 1997).

However, researchers recommend that the scope and nature of teacher training should be modified and in the interim, school social workers should be employed in all public schools to fulfill the functions of LHAP (James *et al.*, 2006a). School social workers could assist in overcoming the obstacle of educating learners from problematic family backgrounds, as is evident in the reports of drug trafficking, violence among peers, alcohol abuse, and high drop-out rate, among other social problems (Perlman *et al.*, 1997). In this study there were also reports of poor socio-demographic backgrounds of learners and excessive alcohol abuse, which itself hindered behaviour change. These socio-economic contexts therefore contribute to the breakdown of learning and teaching in schools.

Studies among schools in Mexico, Thailand and South Africa revealed that teachers have to be prepared for a range of problems, including forced sex, malnutrition, hunger, poverty, AIDS, criminal gangs, lack of books or people to assist at home, all of which impact in the class room (Stewart *et al.*, 2001). The culture of learning and teaching has changed and has to be viewed

holistically to be relevant. Intervention efforts in schools therefore need to be upscaled to incorporate a broader ecological perspective of learners' learning (Stewart *et al.*, 2001).

The culture of learning and teaching is also affected by the lack of resources in much of the sub-Saharan Africa schools, as was evident in this study. There were inadequate chairs for learners and some had to stand during sessions, which was disruptive. Further, audiovisual equipment was of a poor standard. Teachers also indicated that they had to be innovative and supplement department curriculum with their own resources including posters and games. Some schools had a budget to purchase such items while others used personal funds. For AIDS prevention programmes special resources are needed to enhance the programme including human resources, videos, poster making, art supplies and creative displays. Schools that lack resources including electricity cannot have access to these health promotion modalities. Therefore teachers cannot be tasked to promote the LHAP effectively when they are highly pressurized to educate children academically and they lack adequate resources to teach (Gallant and Maticka-Tyndale, 2004).

The large number of learners in classrooms in this study of between forty- fifty also hindered the effective teaching of the LHAP. These numbers were not conducive to skills training and role-plays.

The South African governments response to prevention and management of HIV/AIDS is the implementation of the LHAP, publishing comprehensive HIV/AIDS regulations for schools, development of resource guidelines on HIV/AIDS, and the training of school management teams and governing bodies on HIV/AIDS (Department of Education, 2004). Contrarily this study reported inadequacies and inconsistencies in the quality of training for teachers which implies that the government's response is not happening in a consistent manner. In a six day teacher training programme in Cape Town, South Africa, aimed at increasing knowledge and skills to teach the Life Skills' curriculum among Grade 8 learners, teachers reported that the programme increased confidence and comfort in teaching sexuality (Ahmed *et al.*, 2006). However, there were still gaps in transferring knowledge and facilitating teaching methods into the classroom context (Ahmed *et al.*, 2006). The need for ongoing teacher training and ongoing support in the area of reproductive health was therefore evident.

Similarly, researchers in South Africa (Reddy and James, 2001) reported that teachers expressed a need for more training on AIDS and a preference for health experts to address the topic of HIV/AIDS. Research in Peru (Caceres *et al.*, 1994) also reported that government departments that included sex education in the curriculum failed to provide the infrastructure, including educational materials and training for teachers. This confusion and inconsistency in policy and actual practice impedes the quality of education and the implementation of an effective Life Skills' education programme. In addition, two studies (Visser, 1996; Kinsman *et al.*, 2001) have mentioned that teachers did not address some of the major HIV/AIDS prevention issues due to fear of community disapproval, reluctance to discuss sex and HIV,

curriculum overload and preference for doctrinaire instruction (Gallant and Maticka–Tyndale, 2004).

Teachers in the Wentworth study reported that the Life Skills' education programme was merely an academic exercise and changes in behaviour were not forthcoming. Similarly the Life Skills' school curriculum which began in KwaZulu–Natal in 2001, was reported to have a positive impact on learners' knowledge of HIV/AIDS, attitudes about abstinence and intention to use condoms, which are important for laying the groundwork for behaviour change (Reddy and James, 2001). There was however, no evidence of increased adoption of such protective behaviours as abstinence and condom use (Reddy and James, 2001). This may be because the teachers did not focus as strongly on the Life Skills' components as on the factual HIV/AIDS information.

5.4. Conclusion

The perception that the LHAP is itself contributing to behaviour change is not accurate as it is evident that other social and contextual factors need to be considered in addition to teachers' skills, comfort levels and effectiveness (Reddy and James, 2001). Time and space constraints in implementing the curriculum, insufficient teacher support, inadequate resources together with no systematic process of evaluation of the Life Skills' programme in schools are major drawbacks of LHAP which is supported by other researchers (James *et al.*, 2006a; James *et al.*, 2006b).

The schools in Wentworth further epitomize many schools in South Africa and a collaborative response is essential. Discrepancies in programme implementation need to be standardized for all schools, if a high standard of LHAP is to be achieved. Management structures also play a role in ensuring that teachers are teaching, structures are in place to implement the Life Skills' programme effectively and children are enrolling and remaining in schools (Coombe, 2000).

Undoubtedly, despite these shortcomings, the positive and caring nature of teachers was evident in all schools. Teachers worked under tremendous pressure to meet the requirements of the Department of Education, even to the point of linking with the health and welfare facilities, to empower learners and their families.

The culture of learning would further improve in South African schools if the Department of Education offers schools the support they require in all areas identified as obstacles in this study, as well as in professional support for learners. Teachers can then concentrate on educating while professional staff can focus on skills building and behaviour change monitoring programmes. AIDS prevention efforts would show promise provided upscaling and refocusing efforts are prioritized.

The baseline study follows and outlines the evaluation of learners under study in terms of sexual behaviours and demographic factors.

Chapter 6: Baseline Study

A. Sexual Risk Behaviours at Baseline

Objective 2: To investigate the practice of sexual risk behaviours among high school learners.

Sexual risk behaviours among adolescent learners are particularly detrimental to their health as they jeopardize the accomplishment of the normal developmental tasks, the fulfillment of expected social roles and the acquisition of essential skills to proceed to the next stage of young adulthood (Jessor, 1991). In addition many young people do not perceive themselves to be at risk and this prevents them from accessing or using protection when needed (Harrison, 2005). In South Africa HIV has been superimposed on already poor sexual health outcomes of young people such as high teenage pregnancies (Harrison, 2005). Risk behaviours therefore deserve further analysis in view of the high prevalence of HIV/AIDS among young people (Roos *et al.*, 2006) and the fact that adolescent mortality is often not due to diseases but preventable behaviours (Wild *et al.*, 2004).

6.1. Methodology

6.1.1. The Sample - Learners

The study allocation of the sample was made as a whole group. The school was regarded as the primary sampling unit. The study population consisted of all Grade 10 learners attending all public high schools in the Wentworth community. The Grade 10 learners had completed two years of the Life Orientation subject as an examinable subject and therefore had considerable grounding in HIV/AIDS education. Further, they had a class period allocated for

the teaching of Life Orientation, which was not examinable at the time of the study in 2004. Hence, there was less pressure on teachers to complete a curriculum and these class periods were used for the intervention. School 1 had nine Grade 10 classes with class numbers ranging from 30 to 45 learners and with a total Grade 10 population of 325 learners. School 2 had six Grade 10 classes with class numbers ranging from 41 to 47 learners and with a total Grade 10 population of 241. School 3 had six Grade 10 classes with between 46 to 49 learners, and with a total Grade 10 population of 239 learners. The sample of Grade 10 learners in the study totalled 805 learners. At baseline a total of 760 learners completed questionnaires. Of the 805 learners, 45 questionnaires had to be excluded as some were returned with incomplete information on the demographics and coding while others returned blank questionnaires. The 45 did not include the absentees at baseline however in subsequent evaluations in time 2, 3 and 4, missing data included absentees as well as incomplete questionnaires.

6.1.2. Inclusion and Exclusion Criteria of Learners

Inclusion Criteria

1. Learners who were in Grade 10 in 2004
2. Learners attending the schools where the study was to be conducted.
3. All learners irrespective of sex and age.
4. Provision of both learner and parental written consent.

Exclusion Criteria

1. Learners whose parents had refused participation
2. Learners who wanted to participate but had parental consent forms not signed.

There were no objections to participation in the study from learners and parents.

6.1.3. Instrument

6.1.3.1. The Questionnaire

The questionnaire (Appendix 10, p280) used at all four stages of the study, was based on the American YRBSS (Youth Risk Behaviour Surveillance System) (Centre for Disease Control, 2002) together with Behaviour Change Surveillance (Johns Hopkins School of Public Health, 2002) and WHO questionnaires for learners (WHO, 1994). The YRBSS, was developed by CDC in collaboration with federal, state and private–sector partners, in the United States. The YRBS (Youth Risk Behaviour Survey) was replicated in South Africa in 2003 (Reddy *et al.*, 2003). These questionnaires were all validated instruments that have been tested and retested to ensure validity. The purpose of the YRBSS was to determine the prevalence and age of initiation of health risk behaviours, assess whether health risk behaviours increased, decreased or remained the same over time, examine the co–occurrence of health risk behaviours among young people, provide comparable national data and monitor the progress towards achieving the healthy people objectives by 2010 (Centre for Disease Control, 2002). The YRBSS acknowledged that the health of young people is critically related to the health–related behaviours they choose. These behaviours included tobacco use, alcohol and drug use, violence and sexual behaviours that may result in HIV infection and pregnancy, among others. The leading cause of death among young people was therefore related to these risky behaviours (Centre for Disease Control, 2002). The present study selected questions from the YRBSS and YRBS that were related to sexual risk behaviours only.

Section 1 reported on the demographic data of the population under study. There were eight questions including ‘age, date of birth, sex, race, religious group, employment status of parent, living arrangements and the work type of the person they lived with’.

Section 2 reported on HIV risk associated behaviour. There were thirty one questions which included 'have you ever had sex, the type of sexual intercourse practised, age of first sex, preference for older or same age partners, ideal age to have first sex, relationship with person at last sex, received money or gifts for sex, have you ever been forced to have sex, number of people you had vaginal /anal/oral sex with in the past twelve months, how many people did you have sexual intercourse with in the past three months?, in the past three months have you reduced the number of partners you are involved with, did you drink alcohol/ take drugs the last time you had sex ?, how often do you use alcohol/drugs ?, did you use a condom at last/every sex ?, have you been pregnant or made someone pregnant ?, have you ever had a STI in the last year/anytime in your life ?, have you had any symptoms of a STI in the past twelve months, would you go to Wentworth Hospital for medical assistance or to have an HIV test?'

Section 3 reported on the mediating factors on behaviour namely knowledge, beliefs, attitudes, subjective norms, self-efficacy and intentions. Responses were coded on a Likert type scale from 1 strongly disagree, 2 disagree, 3 agree and 4 strongly agree or 1 not confident, 2 a little confident, 3 moderately confident and 4 very confident while the 0 option referred to those with 'no opinion' (do not know) and these scores were regarded as missing. Scales were developed and the Cronbach's alpha for reliability is presented.

a. **Knowledge:** There were thirteen questions including the following: 'only people who look sick can spread the AIDS virus, only people who are older than me can get the AIDS virus, condoms can reduce my risk of getting the AIDS virus, I can't get AIDS if I have sexual intercourse just one time, I can get AIDS if I have sex with many partners, I can get AIDS by touching or hugging someone, I can reduce my chances of getting the AIDS virus if I delay

my first sexual experience, I can get AIDS by having anal sex with out a condom, having sex with a virgin can cure AIDS, only people who have sex with gay people get AIDS, the main body fluids that contain HIV are semen, blood, breast milk and vaginal secretions, I can get AIDS by having sexual intercourse with someone who has shared injected drug needles and if I have a negative test result that means that I cannot get HIV/AIDS'. Alpha = 0.72.

b. Beliefs: There were fifteen belief questions namely, 'condoms break easily so I prefer not to use it, if I use a condom sometimes/every time I can prevent myself from getting AIDS, using a condom will offend my partner, people who carry condoms have sex with a lot of people, abstinence is the best way to prevent the spread of HIV/AIDS, my friends will laugh at me if I delay my first sexual experience, most of friends about my age have had sex at least once, a person who loves his partner will allow them to have sex with them, sex is not good when a condom is used, the use of condoms interrupts sex, it is embarrassing to use a condom, using a condom shows lack of trust, I need to enjoy my fellow learners by having many sexual partners and having sex with one partner is boring'. Alpha = 0.80.

c. Attitudes: There were six items for this question, namely, 'I feel it is all right to have sex without a condom sometimes as I know what I am doing, I am too young to get HIV, it is alright for me to have sex without a condom sometimes if we know each other well, I feel it is OK for me to have many sexual partners as I need the experience and I feel it is just not cool to delay my first sexual experience'. Alpha = 0.80.

d. Subjective Norms: There were nine items in this sections and included questions on, 'approval of condom use by parent/guardian, religious group and friends, approval of having many sexual partners by parent/guardian, religious group and friends and approval of having sex before marriage by parent/guardian, religious group and friends'. Alpha = 0.83.

e. **Self-efficacy:** There were sixteen items in this section and included questions on, 'confidence levels to abstain from sex with a person you know for a few days, with a person you know for more than three months, with a person who offers you gifts, with a person you care about deeply, with someone who has power over you like a teacher and if you have been drinking alcohol. Confidence levels in terms of condom use at every sex, in delaying first sex until maturity, having sex with one partner and condom use if taking alcohol/drugs'. Alpha = 0.75

f. **Intentions:** There were seven intention questions including, 'intentions to use condoms every time in the future or every time in the next three months, intentions to delay sex until marriage or until maturity, intentions to reduce the number of partners in the next three months, intentions to be faithful to one sexual partner throughout life and intentions to have only one sexual partner in the next three months. Alpha = 0.57

The Cronbach's alpha for all measures except intentions has satisfactory internal consistency as Alpha > 0.7 (Bland and Altman, 1997). For the intention questions low internal consistency was found. Ideally alpha should lie between 0.61-0.88 to be internally valid (Bland and Altman, 1997).

6.1.4. Procedure

The questionnaire was completed by all learners at four time points of the study namely time 1 to time 4. Chapter 3 presents a detailed account of the study procedure.

6.1.5. Data Analysis

6.1.5.1. Analysis of Baseline Results (Time 1)

Demographic variables were compared between the three schools using ANOVA with Bonferroni post hoc tests for quantitative variables (e.g. age), and using Pearson's Chi square for categorical variables (e.g. sex). When using Chi square the assumption of <20% of cells with expected counts <5 was checked. In order to assess the association between baseline demographic risk factors and ever having sex at time 1, binary logistic regression analysis was conducted using a backward elimination method based on likelihood ratio tests. Risk factors were first tested for association with sexual behaviour using Pearson's chi square for categorical predictors and the learner t-tests for quantitative normally distributed variables. Those found to be significantly related to sexual behaviour were entered into a logistic regression model. Likelihood ratio tests were used to eliminate non significant variables until a final model was achieved. Interaction terms were assessed in the same way and dropped if the likelihood ratio test indicated they did not improve the fit of the model. A goodness of fit test was conducted on the final model as well as ROC analysis to assess the area under the curve.

6.1.5.2. Prevalence of Sexual Risk and Protective Behaviours at Time 1

Pearson's Chi square was used to compare the proportion of learners reporting risky behaviours between the control and intervention schools. Frequencies and percentages of participants with a valid response were calculated. Sexually inactive participants at baseline were excluded from this analysis, after the first variable "are you sexually active" which used both positive and negative responses in the Chi square analysis. In all analyses the assumptions relating to the use of Chi square were checked.

6.1.5.3. Gender Differences in Sexual Behaviour between Intervention and Control Groups at Time 1

In order to assess the association between gender and risk behaviours as well as intervention/control grouping and risk behaviours simultaneously, binary logistic regression analysis was conducted using the enter method. Risk behaviours were reclassified into binary variables if not already binary, e.g. age at first sex was classified into <16 years (under the legal age) and ≥ 16 years. Control or intervention group, and gender were entered into the model simultaneously, with no selection procedures. Odds ratios and 95% confidence intervals were reported, as well as Wald Chi square P values for each independent variable. The female control group was predominantly used as the reference group as they were the group with the least risky behaviours.

6.2. Results

6.2.1. Baseline Results

The results presented below include demographic information, sexual risk behaviours, protective behaviours and gender differences for risk behaviours at time 1.

6.2.1.1. Demographic Information of Learners at Wentworth High Schools

The following section provides a description of the population under study. The data are presented per school, so as to illustrate the similarities and differences between the three schools and hence to assess whether or not there were any statistically significant differences between the three schools, in respect of the demographic characteristics of the intervention and control groups at baseline.

Table 4. Demographic Information of Learners showing Intervention and Control Schools at Baseline (n/%)

Demographic Categories	School 1 I	School 2 I	School 3 C	Total	P* value
Mean Age (years)	n = 311 15.41	n = 208 15.39	n = 239 15.72	n = 758 15.51	0.001
(95% CI)	(15.30, 15.53)	(15.24, 15.55)	(15.57, 15.87)	(15.43, 15.59)	
Sex	n = 312	n = 208	n = 239	n = 759	0.51
Female	174 (55.8)	120 (57.7)	145 (60.7)	439 (57.8)	
Male	138 (44.2)	88 (42.3)	94 (39.3)	320 (42.2)	
Race	n = 311	n = 208	n = 239	n = 758	<0.00
Coloured	262 (84.2)	107 (51.4)	48 (20.1)	417 (55.0)	
Indian	10 (3.2)	7 (3.4)	0 (0.0)	17 (2.2)	
Black	31 (10.0)	92 (44.2)	190 (79.5)	313 (41.3)	
White & others	8 (2.6)	2 (1.0)	1 (0.4)	11 (1.5)	
Religion	n = 311	n = 205	n = 237	n = 753	<0.00
Christian	291 (93.6)	172 (83.9)	193 (81.4)	656 (87.1)	
Moslem/Hindu	16 (5.1)	4 (2.0)	2 (0.8)	22 (2.9)	
African Trad.	2 (0.6)	25 (12.1)	34 (14.3)	61 (8.1)	
No Religion	2 (0.6)	4 (2.0)	8 (3.4)	14 (1.9)	
Live With	n = 309	n = 202	n = 234	n = 745	<0.00
Both Parents	171 (55.3)	88 (43.7)	79 (33.8)	338 (45.4)	
Any one else	138 (44.7)	114 (56.3)	155 (66.2)	407 (54.6)	

*I-intervention group; C-control group * For age: ANOVA; For categorical variables: Chi square*

Table 4 shows that at baseline there were statistically significant differences between the three public high schools in Wentworth with respect to age, race, religion and with whom learners lived with. The total mean age for learners was 15.1 years (CI = 15.43, 15.59). School 3 had significantly older learners than schools 1 and 2 however schools 1 and 2 are not different from each other. Although the P value for age was statistically significant the magnitude of these differences may be of no practical importance since they were small. There were more females than males in all schools however no statistically significant differences were found for gender. The majority of learners were from the Coloured race group across all schools and the 'black' race group was predominantly represented in school 3. Most of the learners were from the Christian religion, more so in school 1. The African Traditional religion was the second highest representative religious group, with most learners in school 2 and school 3. There was a statistically significant difference between learners living with both parents and anyone else between schools. The demographics of the population under study therefore illustrate that the population was not homogeneous. Demographic factors were explored further to determine if there was any association between demographics and sexual activity. The following table illustrates these findings:

Table 5. Logistic Regression showing Adjusted ORs and P values for Demographic Factors including Age, Sex and Religion (n = 753)

Demographic Factor vs Sexual Activity	OR	B**	SE***	P value	95% CI
Age					
15 years vs. 14 years	1.63	1.66	0.48	0.10	0.92 - 2.89
16 years vs. 14 years	3.99	4.57	1.21	<0.001	2.20 - 7.24
17-20 years vs. 14 years	7.59	6.23	2.47	<0.001	4.01 -14.35
Sex					
Males vs Females	4.10	8.13	0.73	<0.001	2.92-5.77
Religion					
Moslem/Hindu vs Christian	0.77	-0.48	0.41	0.63	2.92-5.77
African Traditional Religion vs. Christian	2.07	2.42	0.62	0.02	1.15-3.75
No religion vs Christian	5.13	2.33	3.60	0.02	1.30-20.31
Missing vs Christian	2.20	0.82	2.12	0.41	0.33-14.56

** Regression Coefficient; *** Standard Error of Regression Coefficient, Logistic Regression

Table 5 shows that 16 year olds were 3.99 times more likely to be sexually active than 14 year olds and 17-20 year olds were 7.59 times more likely to be sexually active than 14 year olds and these differences were statistically significant (P < 0.001 respectively). Similarly males were more likely to be sexually active than females and this also was statistically significant (P < 0.001). The African Traditional Religion were 2.07 times more likely to be sexually active than the Christian religion and those with no religion were 5.13 times more likely to be sexually active than the Christian religion and these differences were statistically significant (P = 0.02 for both groups). The logistic regression modeling process for the formulation of this model and the crude odds ratios is shown in Table 57, p336. In the original model the demographic factors of school, group, sex, age, race, religion, employment of parents, who children were living with and the type of employment of parents were included. The final model shown above includes age, sex and religion.

6.2.1.2. The Prevalence of Sexual Risk Behaviours at Baseline (T1)

This section focused on sexual behaviour practices of high school learners at baseline (T1), with a focus on identifying key risk behaviours, the consequences of risk behaviours and protective behaviours. Gender differences in risk behaviours were explored together with the determinants of sexual behaviour. Comparison of intervention and control groups at baseline was undertaken, in order to investigate the population under study. The risk behaviours included, ever had sex, age of sexual initiation, alcohol use at last sex, forced sex, preference for older partners, the type of sexual relationships, whether money or gifts were exchanged for sex, and the type of sexual intercourse practised. The consequences of risk behaviours included pregnancy and STIs. Protective behaviours included condom use. The determinants of sexual behaviour included knowledge, attitudes, beliefs, subjective norms, self-efficacy and intentions. Only affirmative responses are presented.

A. Sexual Risk Behaviours

Table 6. Prevalence of Sexual Risk Behaviours in Intervention and Control Groups at Baseline (n/%)

Sexual Risk Behaviours	I n = 521	C n = 239	Total n = 760	P value
Ever Had Sex	n = 517 177 (34.2)	n = 238 86 (36.1)	n = 755** 263 (34.8)	0.61
Age of Sexual Initiation	n = 154	n = 71	n = 225***	0.04
9-12	22 (14.3)	21 (29.6)	43 (19.1)	
13-15	81 (52.6)	27 (38.0)	108 (48.0)	
16-20	25 (16.2)	12 (16.9)	37 (16.4)	
Do not Know	26 (16.9)	11 (15.5)	37 (16.4)	
Alcohol Use at Last Sex	n = 153 53 (34.6)	n = 73 11 (15.1)	n = 226 64 (28.3)	0.002
Forced to have Sex	n = 172 9 (5.2)	n = 80 9 (11.3)	n = 252 18 (7.1)	0.08
Preferred Older Partners	n = 154 113 (73.4)	n = 69 32 (46.4)	n = 223 145 (65.0)	<0.001
Relationship to Person at Last Sex	n = 147	n = 66	n = 213	0.27
Steady	87 (59.2)	44 (66.7)	131 (61.5)	
Casual	51 (34.7)	21 (31.8)	72 (33.8)	
Commercial sex worker	9 (6.1)	1 (1.5)	10 (4.7)	
Received Money or Gifts for Sex	n = 164 66 (40.2)	n = 69 36 (52.2)	n = 233 102 (43.8)	0.09
Type of Sexual Intercourse	n = 172	n = 79	n = 251	0.09
Vaginal	121 (70.3)	54 (68.4)	175 (69.7)	
Anal	1 (0.6)	1 (1.3)	2 (0.8)	
Oral	8 (4.6)	10 (12.7)	18 (7.2)	
Any Combination	42 (24.4)	14 (17.2)	56 (22.3)	
Number of Partners in the Past Three Months	n = 143	n = 66	n = 209	0.82*
None	53 (37.1)	29 (43.9)	82 (39.2)	
1-3	37 (25.9)	17 (25.8)	54 (25.8)	
4-6	16 (11.2)	7 (10.6)	23 (11.0)	
Over 7	6 (4.2)	3 (4.5)	9 (4.3)	
Do not Know	31 (21.7)	10 (15.2)	41 (19.6)	

*I-intervention group; C-control group, * 25% of cells had expected counts of <5, ** of n = 805, n = 755 answered this question, *** of n = 263, n = 225 answered this question. The number of respondents varied between n = 209 & n = 252 for the other questions on sexual risk behaviours, Pearson's chi square*

Table 6 shows that over a third of the learners were sexually experienced at T1. No statistically significant differences were recorded for ever had sex between the intervention and control group at baseline. More control group learners initiated sex in the 9-12 age group than intervention group learners. There was a statistically significant difference between the intervention and control schools with regard to age of sexual initiation ($P = 0.04$). Further more learners in the 13-15 age groups initiated sex in the intervention schools than the control schools. There were similar percentages of older learners who initiated sex in the intervention and control schools.

At T1 a higher percentage of learners in the intervention group than the control group used alcohol at last sex ($P = 0.002$). However, a higher percentage of learners in the control group than the intervention group, reported being forced to have sex, although this was not statistically significant. There were more learners in the intervention schools that preferred older partners than those in the control school and this relationship was statistically significant ($P < 0.001$). More control group learners than intervention group learners were involved in relationships with steady partners. About a third of learners were involved in casual sex, and less than ten percent of learners had engaged in relationships with sex workers at last sex.

More control group learners received money or gifts for sex than intervention group learners but this was not statistically significant. No statistically significant relationship was found between the type of sexual intercourse and the group learners were in ($P = 0.09$). Most learners practiced vaginal sex, while there were reports of oral, anal and a combination of methods of

intercourse. There was no statistically significant difference between the intervention and control schools with regard to the number of partners that learners had. The highest proportion of partners was in the 1 to 3 group, followed by 4 to 6 partners. A high proportion of partners were recorded for the 'do not know' category.

B. The Consequences of Risky Behaviour

Table 7. Prevalence of the Consequences of Risk-Taking Sexual Behaviour in Intervention and Control Groups at Baseline (n/%)

Risk Behaviours	I	C	Total	P value
Been Pregnant/Made Someone Pregnant	n = 149 18 (12.1)	n = 73 5 (6.8)	n = 222 23 (10.4)	0.23
STIs in the Last year	n = 156 6 (3.8)	n = 74 4 (5.4)	n = 230 10 (4.3)	0.58

I-intervention group; C-control group, Pearson's chi square

Table 7 shows that although there was a higher prevalence of pregnancy in the intervention than the control group this was not statistically significant (P = 0.23). The control group learners reported a higher prevalence of STIs than the intervention group in the last year, but this relationship was also not statistically significant (P = 0.58).

C. Protective Behaviours

Table 8. Prevalence of Condom Use at Last Sex, at Baseline (n/%)

Protective Behaviours	I	C	Total	P value
Condom Use at Last Sex	n =154 116 (75.2)	n = 67 37 (55.2)	n = 221 153 (69.2)	0.003
Condom Use at Every Sex	n = 153 106 (69.3)	n = 67 31 (46.3)	n = 220 137 (62.3)	<0.001

I-intervention group; C-control group, Pearson's chi square

Table 8 shows that the intervention school had a higher condom use at last sex and at every sex compared to the control school, which was statistically significant (P =0.003 and P = <0.001 respectively). Overall there was a high percentage of condom use at T1 of between 46.3% to over 70.0 %. Further cross sectional analysis of risky sexual behaviours, the consequences of these behaviours and protective behaviour responses between groups are described in the appendix from Table 30 (p 298). Baseline risk behaviours are further summarized into a reference index and illustrate percentage differences between intervention and control groups (Table 41; p303). This summary can be used as a checklist in AIDS prevention agendas and programme planning.

6.2.1.3. Gender Differences in Sexual Behaviour at T1

Gender differences with regard to sexual behaviour were compared between the intervention and control groups at baseline, and only behaviours that showed statistically significant differences between genders are shown in the table below.

Table 9. Analysis of Sexual Risk Behaviour Showing Odds Ratios for Gender Differences Between Intervention and Control Schools at Baseline (n/%)

Sexual Behaviours	Odds Ratio	P value	95% C I
Ever had Sex n = 754 Male C vs. Female C Male I vs. Female C	6.92 4.06	<0.001 <0.001	3.84, 12.47 2.49, 6.63
Alcohol Use at Last Sex n = 228 Male I vs. Female C	7.66	0.008	1.70, 34.43
Age of First Sex < 16 years n = 209 Male C vs. Female C Male I vs. Female C	4.42 5.25	0.03 0.006	1.19, 16.30 1.63, 16.95
Forced Sex n = 384 Female C vs. Male I	11.44	0.003	2.35, 55.68
Casual vs. Steady Relationship n = 214 Male I vs. Female C	4.40	0.01	1.38, 14.01
Preferred Older Partners n = 439 Female I vs. Female C Male C vs. Female C Male I vs. Female C	3.29 2.97 5.14	<0.001 0.002 <0.001	1.76, 6.15 1.47, 6.04 2.78, 9.49
Used Condom at Last Sex n = 221 Female I vs. Female C Male I vs. Female C	3.98 3.96	0.007 0.005	1.45, 10.94 1.53, 10.22
Used Condom at Every Sex n = 222 Female I vs. Female C Male I vs. Female C	2.67 3.18	0.05 0.02	0.98, 7.25 1.25, 8.07

I-intervention; C-control, Logistic Regression Test

6.2.1.4. Summary of Gender Differences in Sexual Behaviour between Intervention and Control Groups

All males irrespective of group were more likely to have ever had sex at baseline than females in the control group and this was statistically significant ($P < 0.001$). Similarly for alcohol use at last sex, initiation of sex below 16 years, casual sexual relationships and preference for older partners, males in both groups were more likely to engage in risky behaviours than female controls. Females in the intervention group were 3.29 times more likely to prefer older partners compared to females in the control group ($P < 0.001$). Females in the control group were 11.44 times more likely to be forced to have sex than males in the intervention group and this was statistically significant ($P = 0.003$). Intervention group learners of both sexes were more likely to use condoms at last sex and consistently, when compared to female controls.

The confidence intervals for most behaviours were wide indicating that for most gender differences statistical significance may have occurred by chance and may not be true.

Narrower confidence intervals were reported for ever had sex between male intervention and female controls, preference for older partners and consistent condom use. This implies that there was a higher probability of these gender comparisons being true.

The graphs below illustrate more clearly the gender differences in risky sexual behaviour between males and females irrespective of group. Males pre-dominated the learner population with high risk behaviours while more females were forced to have sex than males. More males

initiated sex below 13 years of age while more females initiated sex after 15 years of age (Table 42, p315). In figure 6 there were significant differences between gender and age of sexual onset ($P = 0.01$).

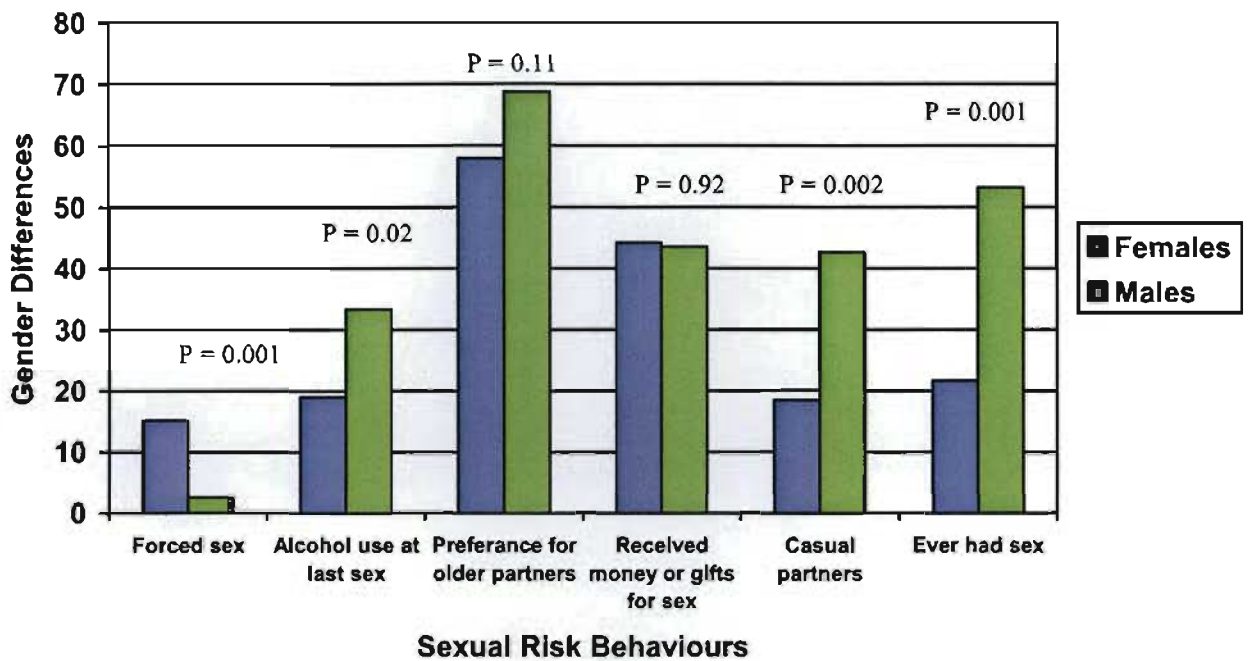


Figure 6. Gender Differences between Females (n = 96) and Males (n = 169) for Sexual Risk Behaviours in % (Pearson's chi square)

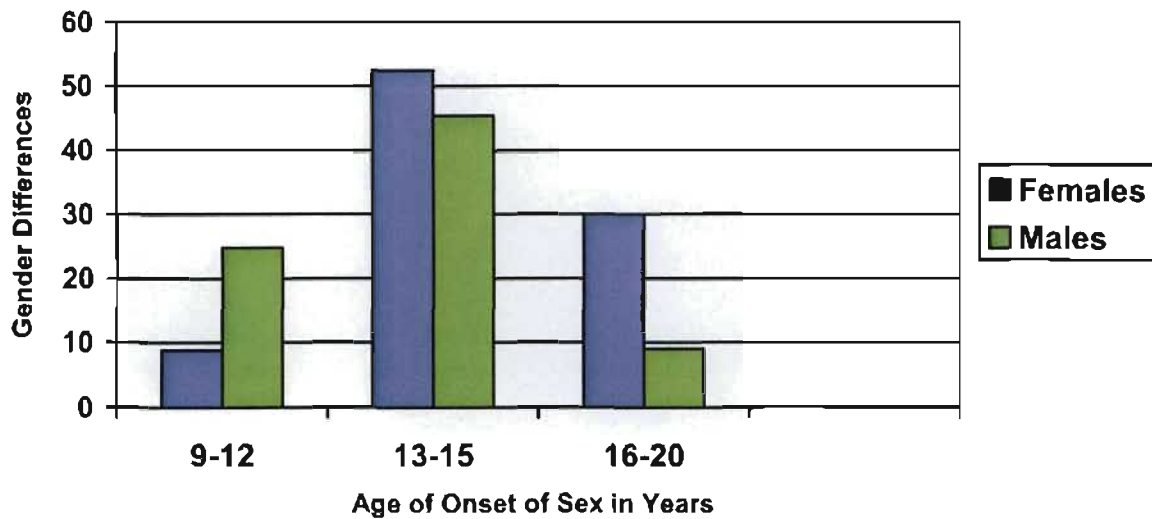


Figure 7. Gender Differences between Females (n = 96) and Males (n = 169) for Age of Onset of Sex in % (Pearson's chi square)

B. The Determinants of Sexual Behaviour at Baseline

Objective 3. To Assess HIV/AIDS Knowledge, Attitudes, Beliefs, Subjective Norms, Self-efficacy and Intentions of Learners

Individual behaviour change models include the determinants of knowledge, attitude, beliefs, subjective norms, self-efficacy and intentions as important constructs that influence adolescent decision making regarding reproductive health (Fishbein & Ajzen, 1975; Janz & Becker, 1984; Fisher & Fisher, 1992; De Vries *et al.*, 2005). The Theory of Reasoned Action (Fishbein & Ajzen, 1975) which is the focus of this research theorizes that for behaviour change one's attitude is determined by one's beliefs. Beliefs in turn are influenced by motivations to comply in terms of subjective norms which together with self-efficacy affect one's intentions to change

behaviour. Behaviour is largely regulated through cognitive processes and through the interaction between environmental and personal factors (Bandura, 1986). Knowledge of HIV/AIDS and prevention messages however requires motivation and behaviour skills to move towards behaviour change (Fisher & Fisher, 1992). Behaviour change is therefore a complex process and difficult to implement given the multiple factors involved. The following section therefore explores the determinants of sexual behaviour at baseline.

6.3. Methodology

The sample and instrument are described in 6.1. above. The questionnaire was completed by all learners at baseline as outlined above in the methodology in 6.1.3.1.

6.3.1. Data Analysis

6.3.1.1. The Determinants of Sexual Behaviour between Intervention and Control Groups at Time 1

The Likert scale included items from 1 to 4 (1- Strongly disagree, 2- Disagree, 3- Agree, 4- Strongly agree) and (1- Not at all confident, 2- A little confident, 3- Moderately confident, 4- Very confident). A 'Don't Know' response was also included. In this study the assumption was that the respondents that scored the 'Don't Know' responses were 'undecided' or had 'no opinion' and hence the statistician regarded them as missing values and excluded them from the analysis (Raaijmakers et al., 2000). A five point scale was not considered for the study due to the possible double meaning of the midpoint. In the case of true 'neutral' meaning, scoring as the middle of the scales is useful, however in the case of an 'undecided' response, scoring as missing is recommended (Kulas *et al.*, 2008). For each determinant the total score

referred to the sum of all the correct answers on the Likert Scale, divided by the maximum determinant score to give a percentage. Negatively phrased statements had their scores reversed. The higher the determinant scores, for example knowledge, the better the outcome. Mean scores for the determinants of sexual behaviour were compared between the intervention and control groups using independent t-tests. The dependent variables were quantitative variables, for example knowledge score percentage, while the independent variables were categorical or binary, for example intervention versus control. Therefore a t test is appropriate.

6.3.1.2. Comparison of Specific Items of Determinants of Sexual Behaviour between Intervention and Control Groups at T1

As items (i.e. specific questions of risky and protective behaviours for each determinant) were on an ordinal Likert scale, medians were compared between the two groups using non-parametric Mann-Whitney tests. The ranked data was not normally distributed and data on the ordinal scale and discrete whole numbers were skewed. Therefore non parametric tests were used.

6.4. Results

6.4.1. The Determinants of Sexual Behaviour at T1

An exploration of the determinants of sexual behaviour between groups was undertaken, in keeping with the theoretical models of behaviour change and objective 3 of the study. The table below provides a summary of the total scores for each determinant to assess whether there were statistically significant differences between the intervention and control schools at baseline.

Table 10. Differences in Comparison of Mean Score for Determinants of Sexual Behaviour in Intervention and Control Groups at Baseline with 95% CI

Total Scores Percent	Mean		P value	95% CI
	I	C		
Knowledge n = 752	67.37 (SD = 16.47)	64.51 (SD = 15.49)	0.02	0.37, 5.36
Attitude n = 760	48.44 (SD = 17.88)	47.30 (SD = 16.06)	0.40	-1.52, 3.79
Beliefs n = 760	55.33 (SD = 20.55)	53.47 (SD = 19.90)	0.24	-1.26, 4.97
Subjective Norms n = 760	61.64 (SD = 24.52)	52.78 (SD = 26.50)	<0.001	4.88, 12.83
Self-Efficacy n = 760	45.89 (SD = 22.89)	44.22 (SD = 21.44)	0.34	-1.77, 5.11
Intentions n = 760	52.18 (SD = 23.68)	52.78 (SD = 22.86)	0.74	-4.15, 2.95

I-intervention group; C-control group, t-test

Table 10 shows that statistically significant differences were found between intervention and control schools for total knowledge scores ($P = 0.02$) and total subjective norms scores at baseline ($P = <0.001$). The 95% CI were however wide indicating that these differences may have occurred by chance and therefore may not be true. No statistically significant differences were reported for other determinant scores.

Specific items for each determinant were explored further in the tables below, to draw a more comprehensive understanding of protective- and risky- sexual behaviours among high school learners at baseline by looking at the median and differences between groups.

Table 11. Learner's Knowledge about Risk and Protective Behaviours of HIV/AIDS showing the Median Score and Differences between Intervention and Control Groups at Baseline

Knowledge Questions	Median*		P value
	I	C	
Risky Sexual Behaviour			
I can get AIDS by having anal sex without a condom <i>n</i> = 466	3.0	3.0	0.17
I can get AIDS if I have sex with many boy/girlfriends <i>n</i> = 692	4.0	3.0	0.18
I can get the AIDS virus even if have sex once without a condom <i>n</i> = 672	2.0	2.0	0.18
I can get AIDS by having sexual intercourse with someone who has shared or injected drug needles <i>n</i> = 611	3.0	3.0	0.59
Protective Behaviour			
I can reduce my chances of getting AIDS if I delay my first sexual experience <i>n</i> = 535	3.0	3.0	0.10
Condoms reduce my risk of getting AIDS <i>n</i> = 632	3.0	3.0	0.25

*Median- 1: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree, I-intervention group; C-control group, Mann-Whitney Test

Table 11 shows no statistically significant differences were found between the intervention and control groups with regard to knowledge about risky and protective behaviours. Median scores for knowledge revealed that learners were in agreement that they could get AIDS by having anal sex, by having multiple partners and by sharing drug needles. Learners were also well informed that they could reduce their chances of getting AIDS if they delayed their first sexual experience and that condoms were protective against AIDS. They were less informed that having sex once without a condom can result in HIV/AIDS.

Table 12. Learners' Comparison of Beliefs about Risk and Protective Behaviours for HIV/AIDS showing the Median Score and Differences between Intervention and Control Groups at Baseline

Belief Questions	Median*		P value
	I	C	
Risky Sexual Behaviour			
Condoms break easily so I prefer not to use them <i>n</i> = 598	2.0	3.0	0.09
If I use a condom sometimes I can prevent myself from getting the AIDS virus and other diseases <i>n</i> = 608	2.0	2.0	0.16
Using a condom will offend my partner <i>n</i> = 478	2.0	2.0	<0.001
My friends will laugh at me if I delay my first sexual experience <i>n</i> = 585	2.0	2.0	0.03
I need to enjoy myself by having many sexual partners <i>n</i> = 651	1.0	1.0	0.97
Using a condom shows lack of trust <i>n</i> = 558	1.0	1.0	0.08
Protective Behaviour			
Abstinence is the best way to prevent the spread of AIDS <i>n</i> = 555	4.0	4.0	0.67
If I use a condom every time I can prevent myself from getting the AIDS virus and other diseases <i>n</i> = 643	3.0	3.0	0.05

*Median- 1: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree, I-intervention group; C-control group, Mann-Whitney Test

Table 12 shows that learners held positive beliefs about all risky and protective behaviours. Statistically significant differences between intervention and control groups with regard to the belief that condom use will offend ones partner ($P < 0.001$), beliefs about friends laughing at them if they delayed their first sexual experience ($P = 0.03$) and protective beliefs of abstinence ($P = 0.05$) (The mean ranks differed between intervention and control groups but the medians remained the same).

Table 13. Learners' Comparison of Attitude about Risk and Protective Behaviours for HIV/AIDS showing the Median Score and Differences between Intervention and Control Groups at Baseline

Attitude Questions	Median *		P value
	I	C	
Risky Sexual Behaviour			
I feel it is just not cool to delay my first sexual experience <i>n</i> = 596	1.0	2.0	0.01
It is all right for me to have sex without a condom sometimes if we know each other well <i>n</i> = 658	1.0	1.0	0.02
It is all right for me to have sex without a condom sometimes as my chances of getting HIV are low <i>n</i> = 592	1.0	1.0	0.08
I feel it is fine for me to have many sexual partners as I need the experience <i>n</i> = 647	1.0	1.0	0.32

*Median- 1: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree, I-intervention group; C-control group, Mann-Whitney Test

Table 13 shows that learners held positive attitudes for all risky behaviours including condom use, delaying first sex and not having many partners. Statistically significant differences were reported between intervention and control groups for attitudes about delaying first sexual experience ($P = 0.01$) and attitudes about irregular condom use ($P = 0.02$) (The mean ranks differed for the former attitude but the median remained the same).

Table 14. Learners' Comparison of Subjective Norms about Risk and Protective Behaviours for HIV/AIDS Showing Median Score and Differences between Intervention and Control Groups at Baseline

Subjective Norms	Median *		P value
	I	C	
Risky Sexual Behaviour			
My parent/guardian would approve of me <i>having sexual intercourse before marriage</i> <i>n = 599</i>	1.0	1.0	0.001
My religious group would approve of me having sexual intercourse before marriage <i>n = 601</i>	1.0	1.0	0.005
My friends would approve of me having sexual intercourse before marriage <i>n = 574</i>	2.0	3.0	<0.001
My parent/guardian would approve of me <i>having many sexual partners</i> <i>n = 622</i>	1.0	1.0	0.13
My religious group would approve of me having many sexual partners <i>n = 611</i>	1.0	1.0	0.04
My friends would approve of me having many sex partners <i>n = 597</i>	1.0	2.0	0.005
Protective Behaviours			
My parent/guardian would approve of me <i>using a condom</i> <i>n = 507</i>	3.0	3.0	0.63
My religious group would approve of me using a condom <i>n = 497</i>	3.0	3.0	0.77
My friends would approve of me using a condom <i>n = 535</i>	3.0	3.0	0.28

*Median- 1: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree, I-intervention group; C-control group, Mann-Whitney Test

Table 14 shows that parents (P = 0.001) and religious groups (P = 0.005) disapproved of having sexual intercourse before marriage and statistically significant differences were found between intervention and control groups (The mean ranks differed but the median remained the same). Learners in the intervention group disapproved of friends having sexual intercourse before marriage however the control group approved of this behaviour. These differences were

statistically significant ($P < 0.001$). Religious groups and friends disapproved of having many sexual partners and these differences were statistically significant ($P = 0.04$ -The mean ranks differed but the median remained the same; $P = 0.005$ respectively). Parents adopted the same norm regarding multiple partners but there were no differences between intervention and control groups. Parents, friends and religious groups approved of condom use however statistically significant differences were only found for religious groups ($P = 0.01$ -The mean ranks differed but the median remained the same).

Table 15. Comparison of Self-Efficacy about Risk and Protective Behaviours for HIV and AIDS showing Median Scores and Differences between Intervention and Control Groups at Baseline

Perceived Self-Efficacy	Median *		P value
	Intervention	Control	
Protective Behaviours			
How confident are you to <i>use a condom</i> if you have been <i>drinking alcohol</i> n = 518	3.0	3.0	0.26
How confident are you to <i>abstain</i> from sex-if you have been drinking alcohol n = 518	2.0	1.0	0.02
How confident are you to use a <i>condom every time</i> you have sexual intercourse n = 570	4.0	4.0	0.46
How confident are you to <i>abstain</i> from sex-with a person who offers you <i>gifts</i> n = 582	2.0	1.0	0.03
How confident are you to <i>abstain</i> from sex-by <i>delaying your first sexual experience</i> until you feel you are mature enough n = 565	4.0	4.0	0.59
How confident are you to have a sexual relationship with <i>one partner</i> n = 591	4.0	4.0	0.55

*Median- 1: Not at all Confident, 2: A little Confident., 3: Moderately Confident, 4: Very Confident, I-intervention group; C-control group, Mann-Whitney Test

Table 15 shows that learners reported moderate confidence for condom use when using alcohol and high confidence for consistent condom use, delaying first sex and being faithful to one partner, but these differences between intervention and control group were not statistically significant ($P = 0.26$, $P = 0.46$, $P = 0.59$, $P = 0.55$ respectively). Low confidence levels were reported for abstinence behaviours when using alcohol ($P = 0.02$) and when offered gifts ($P = 0.03$). These differences were statistically significant.

Table 16. Comparison of Learners' Intentions about Risk and Protective Behaviours for HIV/AIDS showing the Median Score Differences between Intervention and Control Groups at Baseline

Intention Questions	Median *		P value
	I	C	
Protective Behaviour			
I intend to <i>delay</i> my first sexual experience until marriage $n = 544$	4.0	3.0	0.19
I intend to <i>delay</i> my first sexual experience until I am mature enough to commit to a long-term relationship $n = 531$	3.0	3.0	0.04
I intend to use a <i>condom every-time</i> I have sex in the future $n = 637$	4.0	4.0	0.58
I intend to have <i>1 sexual partner</i> in the next three months $n = 467$	3.0	3.0	0.09

*Median- 1: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree, I-intervention group; C-control group, Mann-Whitney Test

Learners had high intentions to practice abstinence, consistent condom use behaviour and being faithful to one sexual partner in both intervention and control groups however these differences were not statistically significant ($P = 0.19$, $P = 0.58$, $P = 0.09$ respectively). Statistically significant differences were reported for delaying sex until in a long-term relationship ($P = 0.04$ -Mean ranks differed but medians remained the same).

The cross sectional analysis of determinants of sexual behaviour in T1 has indicated that for knowledge learners had generally high knowledge of risky and protective behaviours in both intervention and control groups. They were less informed that having sex even once without a condom can result in HIV/AIDS. Positive beliefs were held for all risky and protective behaviours with significant differences reported between intervention and control groups. Further positive attitudes were held regarding abstinence, being faithful and condomizing. Parents, religious groups and intervention group learners disapproved of sex before marriage while control group learners approved of this behaviour. Parents, friends and religious groups disapproved of having many partners while they approved of condom use behaviour. Low confidence levels were reported for abstinence behaviours when using alcohol or when receiving gifts, while high confidence levels were reported for being faithful to one partner, delaying sex and consistent condom use. Moderate confidence levels were reported for condom use when taking alcohol. Learners had high intentions of abstaining, being faithful and condomising.

6.5. Discussion of Baseline Study

Understanding sexual behaviour in adolescent learners is of critical importance in formulating an appropriate response to the AIDS epidemic (Flisher *et al.*, 2003) and is therefore a focus of this baseline analysis. The experimentation with new behaviour patterns as part of the developmental process (Bhana, 2004) may therefore promote early sexual initiation, alcohol use before sex, exchanging money or gifts for sex, preference for older sexual partners and engaging in coercive sexual relationships. All these factors predispose learners to HIV/AIDS.

Risky sexual behaviour therefore remains one of the key drivers of the AIDS epidemic in South Africa (South African Development Community, 2006) namely because the age of sexual initiation has decreased to 15 years, having multiple partners is a norm and there is inconsistent condom use in 43-80% of sexually active men and women (Abdool Karim and Abdool Karim, 2005). Risk behaviours have negative outcomes for learners as they hinder the normal developmental tasks, the expected social roles, the acquisition of essential skills, the achievement of competence and preparation for transition to the next stage of young adulthood (Jessor, 1991; Harrison, 2005).

Some of the Wentworth learners reported having had their first sexual experience below 12 years of age with a high prevalence reported below 15 years. Similarly an analysis of sexual initiation for learners aged 15-24 years, reported that some learners had their first sexual experience before 15 years of age (13%) (Harrison, 2005). Further an inter-age analysis among South African learners supports the trend towards earlier sexual initiation among younger respondents (Shisana *et al.*, 2005b). It is important to identify factors that influence sexual initiation in order to strengthen prevention efforts. Early sexual initiation was also reported as high risk behaviour among high school learners in Cape Town, where 10.8% of females and 23.2% of males were sexually active in Grade 8 (Flisher *et al.*, 2003).

A high percentage of Wentworth learners of over sixty percent initiated sex below the age of 16 years which is below the legal age of consensual sex in South Africa (South African

Government, 2003). Similar findings have been reported by in other research studies (Richter, 1996; Bachanas *et al.*, 2002; Reddy *et al.*, 2003; Martinez–Donate *et al.*, 2004). Gender differences in age of sexual initiation were evident among learners with more males initiating sex below the legal age of consent than females. Varga (1997) reported that males were four times more likely to engage in sex below the age of 16 years than females.

In addition Wentworth learners felt that they could not get the AIDS virus if they had sex once without a condom and therefore had low personal risk knowledge. Similar, findings were reported among high school learners in the Midlands in KwaZulu–Natal, South Africa, in which discrepancies between HIV/AIDS knowledge and behaviour practiced were reported (James *et al.*, 2004). Perceived severity of HIV/AIDS, as is the case in this study, is one of the components of the Health Belief Model (Janz and Becker, 1984) that influence behaviour change. The fact that learners in this study held low personal risk perception to HIV/AIDS implies that sporadic behaviours patterns persisted among these young people with subsequent negative health consequences. Multiple factors of gender differences in behaviour, low personal risk perception to HIV/AIDS and coerced sex especially among females, are therefore factors that promote early sexual initiation among learners.

In addition, a recent survey among female and male adolescents in KwaZulu–Natal, reported that receiving ‘health shocks’ for example, the death of a loved one, are risk factors for sexual initiation. Adolescents in a household that experienced a recent death were 20% more likely to

have initiated sexual activity than those that had experienced a recent severe illness (Hallman, 2006). This factor may be particularly relevant to South African learners, with the increase in mortality among family members to AIDS as reported in focus group discussions. Further cultural practices and peer pressure also impacted early sexual initiation negatively. The 'fertility conundrum' where girls have to display their fertility before marriage, is evident in many African cultures (Leclerc-Madlala, 2002) together with peer pressure to engage in early and unprotected sex, as markers of trust and/or commitment (Varga, 2003). In support of this, Wentworth control group peers approved of sexual intercourse before marriage. Adolescent learners who begin sexual activity early are more likely to have more sexual partners who possibly have been exposed to HIV (UNAIDS, 2004) thus further jeopardizing their own health outcomes.

In addition, preference for older partners over twenty years of age involved an eight to eleven year age gap among the nine to 12 year old Wentworth learners and a five to seven year age gap for the 13 to 15 year olds. Similarly among nineteen year old learners in Cape Town, dating among girls began with boys nearer their own age but this changed to boys that were older (Vundule *et al.*, 2001). The large age gap between partners is detrimental to learners in terms of increased exposure of HIV/AIDS. Pettifor *et al.*, (2005) reported that 15 to 19 year old females, with a partner of five or more years older and 20 to 24 year old females, with a partner one to four years older, were significantly more likely to be infected with HIV in comparison with females with a partner the same age or younger.

The dating of older men may be associated with learners' lower socio-economic situation and an expectation that older working men are more likely to be able to provide for them (Vundule *et al.*, 2001). In addition, 'sugar-daddyism', which pairs middle-aged men with young girls (Betts *et al.*, 2003), may need to be expanded to incorporate the concept of 'sugar-moms' as well. Sixty five percent of Wentworth male learners preferred older partners while over half of the female learners in this study preferred relationships with older men. While females may seek emotional or material support, males may be motivated by physical pleasure and social stability (Varga, 2003). This is consistent with over forty five quantitative studies on age differences of 15 to 19 year old girls in sub-Saharan Africa, where having male partners six or more years older than themselves was reported (UNAIDS, 2004). Gender power imbalances in these relationships might decrease female learner's ability to negotiate protected sex thereby increasing their risk of exposure to HIV (Hegna *et al.*, 2004; UNAIDS, 2004) in keeping with the theory of gender empowerment (Connell, 1987).

Age-mixing is not only applicable to African countries. A similar trend is evidenced with respect to American teenage pregnancies where men who had finished their schooling fathered two-thirds of the infants born to school-age mothers and were on the average 4.2 years older than the senior high mothers and 6.8 years older than the junior high mothers (Hegna *et al.*, 2004). Therefore late adolescent males were identified as being potentially detrimental as sexual partners for early adolescent females (Hegna *et al.*, 2004). Similarly, Mexican females had partners who were three years older than themselves (Martinez-Donate *et al.*, 2004). Age mixing with partners who may be only a few years older, significantly increases the risk of

HIV infection (Pettifor *et al.*, 2005) and therefore remains a major driver of the AIDS epidemic in South Africa (UNAIDS, 2004).

Age-mixing together with early sexual initiation, may be compounded with additional factors of the exchange of money or gifts for sex and exposure to coercive sex (Varga, 1997; Leclerc–Madlala, 2002; Wellings, 2006). Reports among Wentworth learners indicated that over forty percentage of those who were sexually active exchanged money or gifts for sex. This therefore may reflect a culture of materialism in which cell phones, eating out and wearing nice clothes are a necessity or there could be an economic dimension where securing basic needs of food, school fees and shelter were prioritized (Leclerc–Madlala, 2002).

Coercive sex was reported in multiple studies in the country. In keeping with the 7.2% of learners that reported being forced into sexual relationships in the Wentworth study, the YRBS, reported that nationally 9.8% of learners were forced to have sex and 8.3% had forced someone to have sex (Reddy *et al.*, 2003). Similarly 10% of South African learners between 15-19 years of age reported that they were coerced during their first sexual experience (Manzini, 2001). In Cape Town over a third of learners reported having been forced to have sex or having been raped at first sex (Vundule *et al.*, 2001). Further coercion was also a feature of subsequent sexual encounters for many learners (Vundule *et al.*, 2001). In another sample of South African high school learners, from the Cape, 72% of pregnant teenagers and

60% of teenagers who had never been pregnant reported that they had coercive sex (Jewkes *et al.*, 2001).

An analysis of Wentworth learners' age of first sex and forced sex at baseline revealed that over seventy percent of learners between 13-15 years of age, were forced to have sex, which is similar to previous research (Gachuhi, 1999; Bowley *et al.*, 2002; Reddy *et al.*, 2003; Andersson *et al.*, 2004). These findings are in keeping with the high incidence of rape and sexual violence against children in South Africa (Gachuhi, 1999; Reddy *et al.*, 2003; Andersson *et al.*, 2004). Between March 2003 and April 2004, 52 733 rapes were reported in South Africa according to the South African Police Services (Roos *et al.*, 2006). The escalating high incidence of sexual abuse, violence and rape among children of all ages, reinforces gender based violence in relationships (Wood and Jewkes, 1997; Jewkes and Abrahams, 2002; Roos *et al.*, 2006). Nationally 1.5% of adult women reported being raped before the age of 15 years in South Africa (Reddy *et al.*, 2003), while the Human Science Research Council (2003) reported that 15% of South African rape victims were younger than 12 years of age. The South African Demographic Health Survey reported that younger women (15 years and below) were significantly more likely to be raped than older women (Department of Health, 2002). In addition, school teachers were the most common rapists (33%), followed by relatives (21%), recent acquaintances (21%) and boyfriends (10%) (Wood and Jewkes, 1998; Department of Health, 2002;) and this makes one question the safety of learners at schools. Further, the low conviction rates of rapes in South Africa (Roos *et al.*, 2006) seems to encourage the abuse of learners, promote the early age of sexual initiation, thereby fueling the youth–AIDS epidemic

in South Africa. Similarly, in other African countries like Kismu, Kenya and Zambia, girls reported that their first sexual experience had been tricked or persuaded (Manzini, 2001).

Data from this study is consistent with international and local trends that males were more likely to practise less consistent, protective sex (Flisher *et al.*, 1993; Ellen *et al.*, 1996; Eaton *et al.*, 2003; Flay *et al.*, 2004; , Harrison, 2005). In keeping with the daily reports of rape against women in South Africa (Gachuhi, 1999; Reddy *et al.*, 2003; Andersson *et al.*, 2004), gender differences were evident among Wentworth high school learners, as females were four times more likely to have been forced to have sex than males. Gender power imbalances in relationships may therefore leave many females susceptible to coercive sex. These gender disparities are significant, and impact on patterns of sexual networking and age-mixing (Jewkes *et al.*, 2003; UNAIDS, 2004). This is consistent with the theory of gender which stipulates that gender specific norms exist within heterosexual relationships and dictate power imbalances (Connell, 1987).

Focus group discussions revealed that misconceptions about sexual violence in relationships exist including males reporting that sexual violence does not include unwanted touching and forcing sex with someone you know, which is supported by Andersson *et al.*, (2004). Similarly among Thai adolescents who were involved in dating relationships, male adolescents felt that refusal to have sex was an expression of playing 'hard to get' and not that they did not want sex (Sherer, 2006). In addition, even in steady dating relationships, 43% of Thai adolescents

reported engaging in some form of sexual violence and 5% had raped their girlfriends and practised anal sex. A further area of concern is that a significant correlation was found between exposure to gender based violence and post traumatic stress disorder (Sherer, 2006). Qualitative research with young Xhosa males (between 15 to 26 years of age) in rural Eastern Cape suggests that high levels of intimate partner violence, risk-taking practices including early sexual initiation, multiple partnering and unprotected sexual activity arise from the dominant culture's underlying ideals of successful masculinity (Wood and Jewkes, 1998; Dunkle *et al.*, 2006). Learners defined 'masculinity' in terms of the number of sexual partners, choice of main partner in terms of desirability to other partners and the ability to control their girlfriends often by force. Males who were celibate were pressurized by peer groups to be sexually active or others would assume they were 'scared' of women. There were different standards for girls and boys, as boys were allowed to have many partners but girls were supposed to be faithful (Wood and Jewkes, 1998). Many girls disapproved of this but were afraid to challenge their partners because they feared violence or loss of their partners. For boys the actual number of partners was also used to position themselves within peer groups (Wood and Jewkes, 1998).

These gender power imbalances therefore define masculine and feminine roles in keeping with norms, values and belief systems, thereby creating imbalances in power and decision making regarding sexual behaviour (Connell, 1987; Campbell, 2003; Zulu and Paka, 2006). Peer influence is again seen here as having a powerful influence on sexual decision making. Learners may be socialized into these belief systems which are difficult to change. Gender

inequality, violence and sexuality are therefore important factors to consider as drivers of the AIDS epidemic in South Africa (Jewkes *et al.*, 2003; Pettifor *et al.*, 2005; Ross *et al.*, 2006; Sherer, 2006.).

Sexual risk behaviour is further compounded by the use of alcohol and drugs before sex, which is reported consistently in literature (Jessor and Jessor, 1977; Stewart *et al.*, 1999; Bachanas *et al.*, 2002; Champion *et al.*, 2004). Wentworth learners were at increased risk of exposure to coercive sex and HIV as almost a quarter used alcohol at last sex, which is higher than the national figure of 13.8% (Reddy *et al.*, 2003). Further, these learners reported that they had little or no confidence in their ability to use a condom and to abstain from sex, if they had been drinking alcohol, which suggests additional risk exposure of being unable to practice protective sex, when self-efficacy is low. Reported drug use was low among Wentworth learners however even minimum drug use increases risk of more deviant behaviours. Gender trends in the Wentworth study indicated that males were over seven times more likely to use alcohol than females.

The early use of alcohol among learners in South Africa has been associated with an increased risk of experiencing attempted or actual forced sex among learners in South Africa (Andersson *et al.*, 2004; James *et al.*, 2006a). Similarly, strong associations have also been reported between alcohol use and sexual victimization of adolescent females (Champion *et al.*, 2004). In addition, researchers among South African adolescents, in Cape Town and Durban, suggest

that there is a strong relationship between personal attributes and peer influence, and drug use (Brook *et al.*, 2006). More specifically adolescents with unconventional personal attributes tend to seek deviant peers, which in turn contributes to the adolescent's unconventional behaviour, i.e. drug use (Brook *et al.*, 2006). The ripple effects of alcohol use/drug use on coercive sex are therefore risk factors in terms of HIV exposure.

Risk taking behaviour among learners also extends to their choices in partners. The choice of casual partners including commercial sex workers was evident in the Wentworth study, with over a third of sexually active learners who were involved in casual relationships, and a lower percentage were involved with commercial sex workers. Gender differences in the choice of partners were evident, as sexually active male learners from the intervention group were four times more likely to be involved in casual relationships than steady relationships when compared to female control group learners. Learners therefore preferred experimenting with different partners rather than seeking monogamous relationships even though their knowledge, attitudes, beliefs and intentions were in favour of being faithful to one partner. Conflict between cognitive processes and actual behaviours was therefore evident.

Multiple casual partners increase vulnerability to HIV infection. A small percentage of Wentworth learners reported having over four sexual partners. Wentworth learners had good knowledge of the fact that having sex with many partners can result in contracting AIDS however peer norms among control group learners indicated approval of having sexual intercourse before marriage which increases the risk of having more life time sexual partners

as discussed earlier. Learners' knowledge, attitudes, beliefs, subjective norms, self-efficacy and intentions were however protective in terms of engaging in relationships with multiple partners.

Partner reduction has often been a neglected part of the ABC approach to AIDS prevention (Shelton *et al.*, 2004). There would however be no global AIDS pandemic if it were not for multiple sexual partners, especially concurrent partners. The South African Household survey reported that the mean number of reported life time partners for men was seven which was significantly higher than partners for females, which was four (Pettifor *et al.*, 2005). Similarly, among Xhosa speaking learners in the Cape Peninsula a high incidence of sexual activity was often reported among youth, with casual partners (Flisher *et al.*, 1993). While cultural factors that define masculinity seem to encourage multiple partners (Wood and Jewkes, 1998) these practices are detrimental to AIDS prevention efforts. Boys described having a main girlfriend as the one they loved 'the Mercedes Benz' and several other partners as 'cherries' or one-night stands (Wood and Jewkes, 1998). Partner reduction is therefore the potential centrepiece of a unified ABC approach (Wilson, 2004).

In addition to having many partners, Wentworth learners experimented with various types of sexual intercourse, including vaginal, anal and oral sex. A small percentage of learners may have been pressurized to maintain their virginity and therefore engaged in anal or oral sex. Further, these learners may have had a false perception that anal and oral sex was more

protective against pregnancy and possibly HIV. In reality, unprotected anal sex is reported to carry the highest risk of HIV infection (Ntshingila, 2005). In Pietermaritzburg's Greys Hospital, where virginity testing has become common in the surrounding areas, doctors have reported a rise in physical traumas associated with anal sex among young women (Ntshingila, 2005). It is therefore important that AIDS prevention messages are clear and include the fact that anal sex can transmit HIV via infected body fluids. Wentworth learners' knowledge that they could get AIDS by engaging in unprotected anal sex was however protective and consistent with the low rate of anal intercourse found in this study. This implies that the main threat of HIV infection among youth is from heterosexual encounters, which is reiterated by other research studies (Flisher *et al.*, 1993; Bhana, 2004; Abdool Karim and Abdool Karim, 2005).

The religious affiliation of learners was found to be an important factor that influenced sexual behaviour of Wentworth learners. Learners from the African Traditional religion were twice as likely to be sexually active than those from the Christian religion. Sexual culture, gender roles and norms are often rooted in religious belief systems, and may be the reason that the African Traditional religious group, were twice as likely to engage in sexual activity, relative to the Christian religious group. For young Zulu men, early fatherhood is an affirmation of masculinity and strength (Varga, 2003). Eastern Cape learners reported that having multiple partners was related to the ancestral practice of polygamy, a cultural belief that dictates that men are household heads and model their fathers' behaviour of having babies 'around every corner' (Wood and Jewkes, 1998). The African Traditional religion may therefore be influenced by cultural integration and child bearing norms (Jones *et al.*, 2005). Zulu culture in

South Africa has emphasized abstinence before marriage, with the practice of virginity testing (Buthelezi, 2006). However the African culture has allowed love relationships with the practice of 'ukusoma' (sex between the thighs with no penetration) which has been replaced in recent times by penetrative sex (Buthelezi, 2006).

Further, a compounding factor to culture and religion is the fact that there may be diminished interest in religious activity among young people that may be reflective of an emerging autonomy and identity (Steinman and Zimmerman, 2004). The relevance of abstinence before marriage was examined (Mash *et al.*, 2006). Overall 31% of learners reported being sexually active, with 66% having more than one sexual partner, 65% did not use contraceptives at sexual initiation and 50% of females' sexual initiation was forced (Mash *et al.*, 2006).

Therefore, premarital sexual activity was evident in an environment where abstinence was sanctioned as a norm, and may therefore be difficult to reverse. Sexual activity was perceived to be due to peer pressure, the need for seeking and giving love, threats, material gains and boredom (Mash *et al.*, 2006). Some of the motivating factors for sexual activity were evident among Wentworth learners such as receiving material gains in exchange for sex and peer pressure. This implies that church-based youth do not behave significantly different from their larger peer group (Hasnain *et al.*, 2005). Further sexually active church based youth appeared to have a higher rate of multiple partners (66%) (Mash *et al.*, 2006) than in the SA YRBS (48%) (Reddy *et al.*, 2003).

Social norms of Christianity were therefore not protective against youth sexual activity.

Similarly, in a study among Zambian 13 to 20 year old females, religious affiliation with a number of different Christian denominations delayed sexual initiation but reduced the likelihood of condom use when sex was initiated (Agha *et al.*, 2006). The authors concluded that conservative religious groups may therefore have an increased risk of HIV infections as they did not advocate condom use (Agha *et al.*, 2006). However, Wentworth learners reported that their religious group disapproved of sex before marriage and having many partners but approved of condom use.

Religiosity may therefore play a 'gate keeping' role in delaying sexual initiation as with youth in the United States, where frequency of religious attendance was associated with later initiation of sexual intercourse (Jones *et al.*, 2005). This is supported by evidence among Wentworth learners as those belonging to no religious group were over five times more likely to engage in sexual activity than the Christian learners.

However, the relationship between religion and sexual activity has not been explored extensively in research to generalize findings to all populations of learners. Research has reported further that more religious parents who hold conservative attitudes to premarital sex may also be more involved with their children's lives and this may be a positive influence on delayed sexual initiation among adolescents. Findings from research among African-American adolescents also suggests that greater religious involvement is a protective

factor against risky sexual behaviours, as adolescents were more likely to initiate sex at a later age and possessed more favourable attitudes to condom use in the past six months (McCree *et al.*, 2003). The role of religion in AIDS prevention deserves further exploration given the conflicting responses among different populations of youth.

In addition, Wentworth learners reported that their parents disapproved of having many partners and engaging in sex before marriage but approved of condom use. A paradoxical relationship thus arises where condom use is allowed but sexual initiation is disapproved. Learners therefore require clear messages regarding protective and risky sexual behaviours. The presence of a care giver to supervise learner's care may assist this process by discouraging early sexual experimentation (Cohen *et al.*, 2002; Kaufman *et al.*, 2002; Borawski *et al.*, 2003; Le and Kato, 2006). High-risk sexual behaviours was reported to be influenced by the amount of time learners were not supervised by adults (Cohen *et al.*, 2002). Among learners in six United States high schools, more than half of sexually active learners reported that they had sex at home after school. A strong association was reported between the number of hours that youth were unsupervised and their sexual activity (Cohen *et al.*, 2002).

Low parent-child attachment and decreased monitoring of behaviours, therefore play a role in sexual risk behaviours of adolescents (Brook *et al.*, 2006). Research further suggests that open lines of communication and knowledge of adolescent whereabouts, together with a trusting relationship, are important in reducing high-risk behaviours (Borawski *et al.*, 2003). Further,

parental socialization practices contribute to the formation of adolescents' personal attributes which may be linked to a wide range of adolescent problem behaviours including sexual risk behaviours (Chassin *et al.*, 1998). In addition, the potential role of parents particularly in disciplinary practices also impacted on American adolescent sexual risk behaviour. In particular, stricter and more consistent family discipline may serve as a protective factor against sexual risk behaviour (Le and Kato, 2006). The impact of the family and school on adolescent health has been reported in literature (Slap, 2003). A greater sense of connectedness to parents and school was found to decrease the likelihood of sexual activity, regardless of family structure (Slap, 2003). The role of parents in learners' sexual behaviour was not the focus of this study however it is evident that a wide range of adolescent problem behaviours can be prevented if parents played a more active role in supervising their children.

The consequence of risky sexual behaviours is teenage pregnancy. A low percentage of teenage pregnancy was reported among Wentworth learners at baseline (10.4%), however, the Department of Health, reported a higher national pregnancy rate of 15.3% (Department of Health, 2001a) while the South African Demographic Health Survey revealed that approximately 35% of the sample surveyed were pregnant by the age of 19 years (Department of Health, 2002). Among 19 year old learners in Cape Town a strong association was reported between teen pregnancy and having frequent sex without contraceptives (Vundule *et al.*, 2001). Therefore, despite attempts to improve reproductive health information through counselling, increased access to contraception, termination of pregnancy without parental consent and sexual education in the Life Skills' curriculum in schools, the rate of teenage pregnancies in South Africa has not diminished (Richter *et al.*, 2006). Teenagers that become

pregnant often lack economic empowerment and may therefore be trapped in a cycle of dependency on sex for payment to sustain their expenses (Jewkes and Abrahams, 2002). The negative impact of teenage pregnancy in terms of dropping out of school, subsequent economic dependence on the state and possible exposure to HIV (Pettifor *et al.*, 2005) is an area of concern. The gaps in contraceptive information, accessibility and availability require greater attention to prevent teenage pregnancies.

Almost 35% of Wentworth learners engaged in sexual intercourse at baseline which implies that 65% of learners in this study were not sexually active. Maintaining these abstinent behaviours remains a challenge. Although abstinence until marriage is the goal of many abstinence programmes, few young people wait until marriage to initiate sexual intercourse (Santelli *et al.*, 2006). Abstaining from sex in adolescence is accompanied by reduced risk of STIs, including HIV, and pregnancy. Social and religious norms, however, play an integral role in delaying sex until marriage as discussed earlier. Although abstinence is presented as a moral choice for adolescents, access to complete and accurate information on HIV/AIDS and sexual health information, has been recognized as a basic human right (Santelli *et al.*, 2006). A combination of abstinence and protective information should therefore be incorporated in any AIDS prevention intervention.

In the absence of abstinent behaviour and maintaining monogamous relationships condoms remain an integral and essential part of any comprehensive prevention and care programme (UNAIDS *et al.*, 2004). Condoms have been promoted as a frontline defence against AIDS in

many countries, and have been found to effectively reduce HIV transmission (Wilson, 2004). The promotion of condoms as an AIDS prevention strategy has been widely used in South Africa in the ABC framework, with over one million condoms distributed by the Department of Health in 2003 (Wilson, 2004).

The YRBS reported that national prevalence of condom use was 44.8% for school learners in South Africa and 32.3% for learners in KwaZulu–Natal (Reddy *et al.*, 2003). This is lower than sexually active Wentworth learners, in which over 60% reported consistent condom use. Similarly, condom use at last sex amongst learners in South Africa aged 15-24 years increased from 57% for males and 46.1% for females in 2002 to 72.8% for males and 55.7% for females in 2005 (Shisana *et al.*, 2005b). In the Wentworth study no statistically significant differences for gender and condom use were found, however over 70% of males and over 60% of females used condoms at last sex. This finding is in keeping with previous studies (Oliver, 1996; Gebhardt *et al.*, 2003; Martinez–Donate *et al.*, 2004). The high percentage of condom use is a positive step for AIDS prevention in South African and may be linked to increased knowledge and awareness of HIV/AIDS together with other factors such as availability, accessibility and social norms that sanction their use. However, these reports are not consistent with the high HIV prevalence among youth in South Africa as high condom use would imply a decrease in HIV incidence rates. The baseline findings on the high levels of reported condom use has to be viewed with caution, as some learners may have over–reported and some under–reported condom use (Siegel *et al.*, 1998). The greater use of condoms among learners in this study is however a protective factor. The Horizons school–based study in KwaZulu–Natal confirms a

trend towards greater condom use (Stewart *et al.*, 2001). However, the practice of condom use for a few months until 'trust' is established was not uncommon among couples (Jewkes *et al.*, 2003).

Globally conclusive evidence from extensive research among heterosexual couples, in which one partner is infected with HIV, showed that correct and consistent condom use significantly reduced the risk of HIV transmission between men and women (Holmes *et al.*, 2004). Recent analysis of the AIDS epidemic in Uganda, has confirmed that increased condom use in conjunction with the delay of age of first sex and the reduction of partners, were important factors in the decline of HIV prevalence in the 1990s (Singh *et al.*, 2003). Thailand's efforts to de-stigmatize condoms, and its targeted 100% condom promotion for sexworkers dramatically reduced HIV infections in these populations and helped reduce the spread of the epidemic to the general population (Phoolcharoen, 1998). A similar policy in Cambodia has helped stabilize national prevalence, while decreasing prevalence among sex workers (UNAIDS *et al.*, 2004). While in Brazil, early and vigorous condom promotion among the general population and vulnerable groups, has successfully contributed to sustained control of the epidemic (UNAIDS *et al.*, 2004). Inconsistent condom use therefore remains a HIV risk factor for learners (Pettifor *et al.*, 2005).

Gender differences in condom use have been highlighted in this study and may be related to differential self-efficacy levels among males and females regarding their ability to use

condoms (Martinez–Donate *et al.*, 2004). Both male and female intervention group learners were more likely to use condoms at baseline than female control learners. Learners in the control group were moderately confident to use condoms consistently especially when using alcohol, while intervention group learners were very confident to use condoms consistently as discussed previously. Gender norms may therefore play a vital role in condom negotiation, with males sometimes controlling decision making with regard to their use, while females may fear termination of the relationship or sexual coercion if they introduced condoms (Varga, 1997). In many South African communities women are disempowered by social and economic factors that render them unlikely to negotiate condom use with their partners (Abdool Karim and Abdool Karim, 2005).

In addition to gender another major barrier to condom use includes the perception that condoms are associated with infidelity, lack of trust and reports that they make sex less pleasurable (Abdool Karim and Abdool Karim, 2005). Similarly, Nigerian learners held misconceptions that a slipped condom may injure a girl and that condom use suggests lack of trust and fidelity (Ajuwon *et al.*, 2006). Wentworth learners however were well informed that condoms were reliable; their use would not offend their partners and did not show lack of trust in relationships. Further, they held positive beliefs and attitudes towards condom use.

Similarly, other studies (Lurie *et al.*, 1997; Varga, 1997; Stewart *et al.*, 2001) reported that the majority of participants disagreed that condoms denoted mistrust, are unnecessary in serious

relationships, are difficult to carry, show intentions of having sex, cause females to lose respect for their partners and are embarrassing to get. However, among KwaZulu–Natal University students aged 18–25 years, female students attached some stigma to contraceptive use and accessing them from the clinic, while male students favoured condom use for protective sex rather than for contraceptive use (Oyedeeji and Cassimjee, 2006). These conflicting attitudes and beliefs about condom use in different research settings emphasize the need to broaden intervention efforts to all levels of the youth population and to ensure that prevention messages are clear and free of ambiguity.

The low personal risk perception of getting HIV among Wentworth learners presents another barrier to condom use as they were less knowledgeable that having sex once without a condom places one at risk of HIV. Learners who perceive themselves not to be at risk of becoming HIV infected, would be less likely to wear condoms or to accept any other prevention modalities (Abdool Karim and Abdool Karim, 2005). Conflicting findings were reported among South African primary school learners where greater self–efficacy for condom use was reported following a drama intervention (Harvey *et al.*, 2000; Palmer, 2002) while two school–based interventions showed no change in perceptions of personal risk to HIV (Gallant and Maticka–Tyndale, 2004). Perhaps, when faced with more knowledge of the high rates of HIV infection and information about self–protection, learners’ intentions to use condoms may consistently become more positive (Gallant and Maticka–Tyndale, 2004).

Subjective norms of whether others approved or disapproved of condom use as a form of protective sexual behaviour also play an important role in decisions regarding the use of condoms. Wentworth learners reported that their parents, friends and religious group approved of condom use. Many young people were influenced by the positive and negative aspects of societal values (Abdool Karim and Abdool Karim, 2005). South African adolescent boys nominated their peers as having the strongest influence on sexual activities, while girls nominated religious beliefs and their mothers (Oliver, 1996). Religious norms generally prohibit sexual activity outside of marriage and promote abstinence and the value of virginity (Abdool Karim and Abdool Karim, 2005). Conservative social norms remain dominant in many South African settings which may result in conflict between social and religious norms and sexual feelings within relationships. This often may hinder the practice of protective sex, including condom use (Abdool Karim and Abdool Karim, 2005).

D. Conclusion of Baseline Study

Behavioural epidemiology implies that much of the burden of disease can be linked to patterns of human behaviour (Jessor, 1991). Gender inequality is a common risk factor for reproductive and sexual health in terms of communication and negotiation of protective sexual behaviours (Jewkes *et al.*, 2003; Pettifor *et al.*, 2005). The cultural construction and social organization of gender has disempowered young girls in many settings, increasing their vulnerability to HIV infection and its consequences. This was evident in the baseline findings in relationships with substantial age differences and in learners' exposure to coercion in sexual relationships. Early sexual initiation was not uncommon among learners of all ages and

together these factors complicate abstinence behaviours. The underlying construction of masculinity therefore needs to be challenged.

Wentworth learners' preference for many partners, even though they were aware that it increased the risk of HIV, together with the practice of anal sex as possible protection against pregnancy, are also areas of high risk behaviour that predispose them to increased HIV infection.

The baseline findings revealed a cycle of high risk sexual behaviours which often cluster together. Early sexual behaviour is associated with more lifetime sexual partners and higher rates of STIs, substance use and delinquency (Cohen *et al.*, 2002). The influence of religious, parental and peer norms in sexual decision making was evident.

The key drivers of the youth AIDS epidemic therefore include exposure to high risk sexual behaviours, gender disparities in sexual behaviours and negative perceptions about condom use, peer influence on sexual decision making and varying confidence levels for condom use and abstinence behaviours. Prevention agendas therefore need to focus on these fundamental areas in order to encourage more protective behaviours (Jewkes *et al.*, 2002; Ross *et al.*, 2006).

The baseline analysis undertaken was cross sectional and therefore does not take into account the direction of the association in terms of the long-term effects of time, group and the time by group interaction (i.e. the intervention effect). Following intervention 1 and intervention 2 and in keeping with objective 4 of the study 'To implement a HIV/AIDS prevention intervention for high school learners', objective 5 was undertaken. The following section examines behaviour change over time and factors that mediated behaviour change.

Chapter 7: Impact Evaluation

Objective 5. To Evaluate Behaviour and Determinants Changes Over Time between the Intervention and Control Groups.

This section explores the impact of the intervention on sexual behaviours and on the determinants of sexual behaviour. For behaviour change we consider four behaviours, namely: ever had sex, condom use at last sex, alcohol use at last sex and reduction in partners in the past three months. Changes in knowledge, attitudes, beliefs, subjective norms, self-efficacy and intentions, are examined independently. As both behaviour and determinants of sexual behaviour are changing independently at different rates, separate models are presented.

7.1 Methodology

7.1.1. Study Design: An intervention study with a pre-test /multiple post-test design was undertaken. All public high schools together with all grade 10 classes, in the Wentworth area, were selected for the study. Schools were randomly assigned to intervention and control groups.

7.1.2. Sample: The allocation of the sample was made as a whole group. The school was regarded as the primary sampling unit. At baseline a total of 760 learners completed questionnaires. Of the 805 learners, 45 questionnaires had to be excluded as some were returned with incomplete information on the demographics and coding while others returned blank questionnaires.

7.1.3. The Questionnaire: The questionnaire (Appendix 10, p280) used at all four stages of the study, was based on the American YRBSS (Youth Risk Behaviour Surveillance System)

(Centre for Disease Control, 2002) together with Behaviour Change Surveillance (Johns Hopkins School of Public Health, 2002) and WHO questionnaires for learners (WHO, 1994).

7.1.4. Procedure: The questionnaire was completed by all learners at four time points of the study, namely Time 1 to Time 4.

(In chapter 3 and chapter 6 a more detailed account of the methodology of the study is presented).

7.1.5. Longitudinal Data Analysis

In the longitudinal analysis behavioural changes and changes in determinants of sexual behaviour were explored.

Various models were explored in this analysis, for example, combining all determinants of sexual behaviour in one model, combining all behaviours in one model, etc. The GLM analysis further showed that there were no significant differences between one or two interventions. We therefore decided to combine them into one intervention group (Table 28, p297). While it would have been ideal to combine behaviours and determinants of sexual behaviour together in one model, this analysis repeatedly displayed collinearity (Pagano and Gauvreau, 2000). After consultation with numerous statisticians, it was therefore decided that this was not possible. In essence we had two outcomes, namely a change in determinants of sexual behaviour and a change in behaviour. Since both behaviours and determinants of sexual behaviour were very volatile and both changed at different rates, they had to be analyzed

separately^{*}. Further, sexual behaviour was also measured on different subgroups including sexually active and inactive learners. More specifically the 'ever had sex' outcome was measured on the total sample, while 'condom use at last sex', 'alcohol use at last sex' and 'reduced partners in the past three months' were measured for the sexually active learners only. The determinant analysis was measured on all learners. The final model chosen was robust with the number of observations being high, i.e. 2435 (for example, in 'ever had sex') and the standard error was adjusted to include 802 clusters in number. Hence it was not possible for the model to have a type II error. The main effects of group and time are included in the model, to control for changes over time within each group. The interaction effect includes the combined effects of group (either intervention or control group) and time (T1, T2, T3 and T4) (Pagano and Gauvreau, 2000).

Generalized Linear Models (GLM), illustrate the factors influencing behaviour change and changes in determinants of sexual behaviour. These models take into account the baseline scores as well as the changes in scores over time. They describe the risk ratios for the behaviour (categorical data) and coefficients for the determinants (continuous data). In interpreting the GLM models, there are three effects to consider: 1) the time effects 2) the group effect and 3) the time by group interaction effect. More specifically, the time effect describes the time point relative to the baseline, i.e. T2 relative to T1, T3 relative to T1 and T4 relative to T1; irrespective of the group effect. The group effect describes the differences between the intervention and control group, i.e. having one intervention compared to no

^{*} C.Connolly (Personal Communication, MRC Biostatistician, August 3, 2006).

intervention and having two interventions compared to no interventions; irrespective of time. The time by group interaction is the most important effect in determining whether the intervention had an impact. It reports the combined effects as to whether the group the learners were in, over the time period of the study, impacted on sexual behaviour. Statistical significance of the time by group interaction is therefore analogous to an intervention effect and negates any statistical significance reported in the time or group effects. If the interactions between time and group were statistically significant, these take precedence, and one cannot interpret the main effects of time and group. A significant interaction effect can be interpreted as a differential intervention effect over time in the two groups being compared. (Pagano and Gauvreau, 2000; James *et al.*, 2005).

In summary, for longitudinal study designs with between- and within- group effects, the Generalized Linear Model procedure tests three null hypotheses: the hypothesis of no time effect (regardless of group), the hypothesis of no group effect (regardless of time point) and the hypothesis of no interaction between time and intervention group (the intervention effect). The interaction effect is the effect of interest, which if significant states that the dependent variable over time is dependent on the intervention group (i.e. differential effects over time are experienced by the different intervention groups).*

* T. Esterhuizen (Personal Communication, UKZN Biostatistician, April 13, 2007).

7.1.6. Change in Behaviours from T1-T4 Showing Group, Time and Time by Group Interaction

Generalized Linear Models (GLM) was used to examine the effects of time, (T1 to T4), group (intervention vs. control) as well as the time by group interaction effect (intervention effect over time). For behaviours the binomial family of distributions was specified for the dependent variable and then the log link was used. The coefficient was exponentiated to give relative risks. The time–group interaction was treated as a quantitative variable with values ranging from 0 (representing the control group at all time points) to 4 (intervention group at time 4). The following matrix explains this further:

Group	Time	Time by Group Interaction	
0	1	0	
1	2	0	control group
	3	0	
	4	0	
		1	
		2	
		3	intervention group
		4	

The 0 represents the control group at all time points because the coding of the control group was 0 and therefore multiplied with the time points leads to a product of 0 at all time points. The 4 represents the intervention group at time 4 because the coding of the intervention group was 1 and 1 multiplied by each of the 4 time points gave a score of 1 to 4. To adjust for the intra–subject correlation due to the repeated measures design, robust standard errors were used, with clustering on subject number. The binomial family of distributions was used for the dependent variable, and the log link was specified. Risk ratios with 95% confidence intervals

and robust standard errors were reported, with clustering on subject number. In a longitudinal study, odds ratios are not appropriate as they are for retrospective studies hence risk ratios are more appropriate to use. The risk ratio for the interaction effect represents the risk of a one unit increase in the time by group variable, i.e. from 0 to 1, 1 to 2, 2 to 3 and 3 to 4. For these models it was not possible to adjust simultaneously for age, gender and race since the models failed to converge. Sex was however included in the model. Appendix 12 (p 353) outlines the process of formulation of the final models for behaviour.

7.1.7. Change in Determinants of Sexual Behaviour from T1-T4 Showing Group, Time and Time by Group Interaction

Generalized Linear Models (GLM) in stata was used to examine the effects of time, (T1 to T4), group (intervention vs. control) as well as the time by group interaction effect (intervention effect over time). The Gaussian family of distributions was used for the dependent variable, and the identity link was specified. Coefficients with 95% confidence intervals and robust standard errors were reported, with clustering on subject number. The total scores for each construct was the sum of all correct answers, divided by the maximum determinant score, expressed as a percentage. Coefficients show the mean change in y with a one unit increase in x. They are not on a log scale and therefore the coefficient is interpreted as the mean change in y with a one unit change in x. Further we do not need to exponentiate them. Age, sex and race group were used as covariates or factors in all models. Adjusted coefficients were reported. Therefore the higher the score of the determinant on the Likert scale, the more positive the response was.

7.2. Results

7.2.1. Changes in Behaviour from T1-T4

In keeping with the theme of the thesis, behaviours were categorized as risky and protective behaviours. The risky behaviours included ever having sex and alcohol use at last sex, while the protective behaviours included condom use at last sex and reduction in partners in the past three months. The results are presented as risk ratios.

A. Risky Behaviours

1. Ever Had Sex

Table 17. Learners' Ever Had Sex Responses, Showing Risk Ratios (95%CI) for Time Group and Time by Group Interaction Differences (n = 802)

Ever Had Sex	Risk Ratio	SE	P	95%CI
Time Effects				
T2 vs. T1	1.06	0.04	0.05	1.00, 1.14
T3 vs. T1	1.09	0.74	0.15	0.97, 1.23
T4 vs. T1	1.08	0.09	0.30	0.93, 1.28
Group Effects				
I vs. C	0.88	0.10	0.31	0.71, 1.11
Time by Group Interaction	0.99	0.03	0.81	0.93, 1.06
Sex				
Males vs Females	2.54	0.24	<0.001	2.10, 3.07
Missing vs Females	1.62	0.38	0.04	1.02, 2.57

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control, SE-standard error, GLM analysis in Stata

In Table 17, there were no statistically significant time, group or interaction effects for having ever had sex. Therefore the intervention and control groups changed at the same rate over time, with regard to the initiation of sexual activity. The B.A.R.T. intervention did not result in a

decline in sexual initiation, nor abstinence behaviours, and therefore there was no intervention effect for this variable. Males were however 2.54 times more likely to initiate sex than females and this was statistically significant ($P < 0.001$).

2. Alcohol Use at Last Sex

Table 18. Learners' Alcohol Use at Last Sex Responses, Showing Risk Ratios (95% CI) for Time, Group and Time by Group Interaction Differences (n = 424)

Alcohol Use at Last Sex	Risk Ratio	SE	P	95%CI
Time Effects				
T2 vs. T1	1.12	0.19	0.48	0.81, 1.55
T3 vs. T1	0.85	0.26	0.59	0.46, 1.55
T4 vs. T1	1.74	0.55	0.08	0.93, 3.25
Group Effects				
I vs. C	2.57	0.93	0.009	1.27, 5.23
Time by Group Interaction	0.72	0.09	0.02	0.55, 0.94
Sex				
Males vs Females	1.78	0.29	0.001	1.28, 2.47
Missing vs Females	2.24	0.76	0.02	1.15, 4.37

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control, SE-standord error, GLM analysis in Stata

In Table 18 there were no statistically significant time effects for alcohol use at last sex, but a statistically significant group effect ($P = 0.009$) and sex effect ($P = 0.001$) was found. Since the time by group interaction shows statistical significance the main effects of group and sex cannot be interpreted. The intervention group was 28% less likely to use alcohol at last sex when compared to the control group over time. Thus a significant positive effect was shown, for the intervention group relative to the control group in respect of alcohol use at last sex in favour of the B.A.R.T. intervention.

B. Protective Behaviours

1. Condom Use at Last Sex

Table 19. Learners' Condom Use at Last Sex Responses, Showing Risk Ratios (95% CI) for Time, Group and Time by Group Interaction Differences (n = 343)

Condom Use at Last Sex (n = 343)	Risk Ratio	SE	P	95% CI
Time Effects				
T2 vs. T1	1.03	0.07	0.65	0.90, 1.18
T3 vs. T1	1.12	0.12	0.30	0.90, 1.40
T4 vs. T1	0.98	0.16	0.90	0.71, 1.35
Group Effects				
I vs. C	1.39	0.22	0.04	1.01, 1.89
Time by Group Interaction	0.95	0.06	0.37	0.84, 1.06
Sex				
Males vs Female	1.11	0.08	0.13	0.96, 1.27
Missing vs Female	1.11	0.16	0.45	0.83, 1.47

T1-time1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control, SE-standard error, GLM analysis in Stata

In Table 19, there was no statistically significant time effect for condom use at last sex; however a statistically significant group effect was reported. The intervention group was 1.39 times more likely to use a condom at last sex than the control group (P = 0.04). No statistically significant differences were reported between males and females for condom use at last sex. There was no time by group interaction, but rather a group effect for condom use at last sex, which could be due to baseline differences between groups. The B.A.R.T. intervention therefore did not have a positive impact on condom use at last sex. Similar findings were reported for condom use at every sex (Table 43, p316).

2. Reduction of Partners in the Past Three Months

Table 20. Learner's Reduction of the Number of Partners in the Past three months Responses, Showing Time, Group and Time by Group Interaction Differences (n = 283)

Reduction of Partners in Past Three Months	Risk Ratio	SE	P	95%CI
Time Effects				
T2 vs. T1	1.41	0.22	0.03	1.03, 1.95
T3 vs. T1	1.17	0.30	0.54	0.70, 1.96
T4 vs. T1	1.11	0.36	0.75	0.58, 2.13
Group Effects				
I vs. C	0.86	0.29	0.65	0.45, 1.65
Time by Group Interaction	1.08	0.14	0.55	0.83, 1.40
Sex				
Males vs Females	1.11	0.14	0.48	0.86, 1.43
Missing vs Females	0.85	0.26	0.67	0.46, 1.54

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control, SE-standard error, GLM analysis in Stata

In Table 20, there was no statistically significant group or intervention effect shown for learners who reduced number of partners in the past three months. A significant time effect was reported between time 2 and time 1 ($P = 0.03$), i.e. pre-test-post test. All learners in time 2 were 1.41 times more likely to reduce partners when compared to time 1, irrespective of which group learners were in. No significant effects were reported between males and females. The B.A.R.T. intervention therefore did not have a positive impact on the reduction of partners in the past three months.

A significant time by group interaction was reported for alcohol use at last sex. This indicates an intervention effect. The B.A.R.T. intervention therefore impacted learners' behaviour positively

over time, more so in the intervention than the control group. There was no intervention effect reported, in respect of ever having had sex, condom use at last sex or for reduction in the number of partners in the past three months. This therefore indicates that the B.A.R.T. intervention did not have a positive impact on these behaviours, for the duration of the study. A statistically significant group effect was reported for condom use at last sex in favour of the intervention group which may be due to baseline differences between the intervention and control groups. A statistically significant time effect was reported pre–post intervention 1 for reduction in partners in the past three months which may also be due to baseline differences between the intervention and control groups.

7.2.3. Change in Determinants of Sexual Behaviour from T1–T4

The determinants of sexual behaviour under study included knowledge, attitudes, subjective norms, self–efficacy and intentions. To evaluate changes in the determinants of sexual behaviour, Generalized Linear Models (GLM) are presented illustrating the time, group and time by group interaction effects (intervention effect). Demographic factors were also included in this model as described in the methodology in 7.1.1.; p 185 above.

A. Change in Knowledge about Sexual Behaviour Over Time from T1-T4

Table 21. Learners' Total Knowledge Scores from T1-T4, Showing Coefficients (95% CI) for Time, Group and Time by Group Interaction Differences (n = 755)

MODEL 1 Knowledge	Coef.	Semi-Robust SE	P value	95% CI
Time Effects				
T2 vs. T1	1.32	0.76	0.08	-0.17, 2.82
T3 vs. T1	-4.81	1.38	0.001	-7.53, -2.10
T4 vs. T1	-1.03	1.73	0.55	-4.42, 2.36
Group Effects				
I vs. C	-1.51	1.80	0.40	-5.04, 2.02
Time by Group Interaction	1.70	0.68	0.01	0.36, 3.04
Age	-2.01	0.43	<0.001	-2.87, -1.16
Males vs. Females	-2.92	1.02	0.004	-4.93, -0.92
Race				
Indian vs. Coloureds	-3.71	2.42	0.13	-8.46, 1.04-
Black vs. Coloureds	-5.21	1.21	<0.001	7.57, -2.84-
White/other vs. Coloureds	-0.56	4.68	0.90	9.74, 8.61

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control; SE-standard error, Gaussian family of distributions

In Table 21 a statistically significant time effect at T3 relative to T1 was found with T3 learners having a 4.81% lower knowledge score percentage than learners in T1 (P = 0.001). There was no overall group effect for knowledge scores. The time effect cannot be interpreted due to a statistically significant interaction effect for knowledge. Knowledge score percent increased by 1.70% over time (P = 0.01). More specifically, knowledge significantly improved over time in the intervention group compared to the control group. Therefore the B.A.R.T. intervention had a positive effect on increasing knowledge of risky and protective sexual behaviour which was sustained for the duration of the study. As age increased by one year, the mean knowledge score decreased by 2.01% (P< 0.001). Males had on average a

2.92% lower knowledge score than females ($P = 0.004$) and Black learners had a 5.21% lower knowledge score than Coloured learners ($P < 0.001$).

B. Change in Beliefs about Sexual Behaviour Over Time from T1-T4

Table 22. Learners' Total Belief Scores from T1-T4, Showing Coefficients (95% CI) for Time, Group and Time by Group Interaction Differences (n = 756)

MODEL 1 Beliefs	Coef.	Semi-Robust SE	P value	95% CI
Time Effects				
T2 vs. T1	3.02	0.98	0.002	1.08, 4.95
T3 vs. T1	-0.46	1.63	0.77	-3.65, 2.73
T4 vs. T1	-3.34	2.21	0.13	-7.67, 0.99
Group Effects				
I vs. C	-1.45	2.19	0.51	-5.75, 2.85
Time by Group Interaction	1.84	0.86	0.03	0.14, 3.52
Age	-0.30	0.47	0.53	-1.24, 0.63
Males vs. Females	-4.77	1.08	<0.001	-6.91, -2.64
Race				
Indian vs. Coloureds	-0.97	3.29	0.77	-7.43, 5.48
Black vs. Coloureds	-3.04	1.33	0.02	-5.63, -0.44
White/other vs. Coloureds	0.87	3.41	0.79	-5.81, 7.55

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control; SE-standard error, Gaussian family of distributions

In Table 22 a statistically significant time effect for learners in T2 compared with the learners in T1 was found, with an increase of 3.02% in belief scores ($P = 0.002$). There were no group effects for belief scores. The time effect cannot be interpreted due to a statistically significant interaction effect found for beliefs. Belief score percent increased by 1.84% over time in favour of the intervention group ($P = 0.03$). Therefore the B.A.R.T. intervention had a positive impact on belief scores of risky and protective sexual behaviours, as beliefs significantly

improved over time. Males had on average a 4.78% lower belief score than females ($P < 0.001$) and Black learners had a 3.04% lower belief score than Coloured learners ($P = 0.02$).

C. Change in Attitude about Sexual Behaviour Over Time from T1-T4

Table 23. Learners' Total Attitude Scores from T1-T4, Showing Coefficients (95% CI) for Time, Group and Time by Group Interaction Differences (n = 756)

MODEL 1 Attitude	Coef.	Semi- Robust SE	P value	95% CI
Time Effects				
T2 vs. T1	29.06	1.12	<0.001	26.85, 31.27
T3 vs. T1	23.92	1.84	<0.001	20.31, 27.53
T4 vs. T1	25.30	2.32	<0.001	20.76, 29.84
Group Effects				
I vs. C	-3.73	2.12	0.07	-7.88, 42.78
Time by Group Interaction	2.39	0.88	0.007	0.66, 4.12
Age	-1.69	0.49	0.001	-2.67, -0.72
Males vs. Females	-7.20	1.18	<0.001	-9.53, -4.87
Race				
Indian vs. Coloureds	-0.35	3.12	0.91	-6.46, 5.76
Black vs. Coloureds	-2.36	1.47	0.11	-5.25, 0.53
White/other vs. Coloureds	5.86	4.93	0.23	-3.79, 5.53

*T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control; SE-standard error
Gaussian family of distributions*

In Table 23 a statistically significant time effect at T2, T3 and T4 relative to T1 ($P < 0.001$) was found for attitude scores. At each time point there was an increase in more positive attitude scores, irrespective of which group subjects were in namely (29.06% for T2; 23.92% for T3 & 25.3% for T4). No statistically significant group effect was found for attitude scores. The time effect cannot be interpreted due to a statistically significant interaction effect. Attitude score percent increased by 2.39% over time, in favour of the intervention group ($P = 0.007$). Therefore, the B.A.R.T. intervention had a positive impact on attitude scores towards

risky and protective sexual behaviour, as they significantly improved over time. As age increased by one year, the mean attitude score decreased by 1.69% ($P = 0.001$). Males had on average a 7.20 % lower attitude score than females ($P < 0.001$).

D. Change in Subjective Norms about Sexual Behaviour Over Time from T1-T4

Table 24. Learners' Total Subjective Norm Scores from T1-T4, Showing Coefficients (95% CI) for Time, Group and Time by Group Interaction Differences (n = 756)

MODEL 1 Subjective Norms	Coef.	Semi- Robust SE	P value	95% CI
Time Effects				
T2 vs. T1	5.32	1.19	<0.001	2.98, 7.65
T3 vs. T1	3.27	1.86	0.08	-0.37, 6.92
T4 vs. T1	-35.57	2.09	<0.001	-39.67, -31.46
Group Effects				
I vs. C	4.23	2.66	0.11	-0.99, 9.46
Time by Group Interaction	-0.65	0.83	0.44	-2.30, 0.98
Age	-1.06	0.52	0.04	-2.08, -0.03
Males vs. Females	-6.68	1.19	<0.001	-9.03, -4.33
Race				
Indian vs. Coloureds	-2.40	3.96	0.54	-10.17, 5.36
Black vs. Coloureds	-6.71	1.42	<0.001	-9.50, -3.92
White/other vs. Coloureds	-6.89	6.25	0.27	-19.13, 5.35

*T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control; SE-standard error
Gaussian family of distributions*

In Table 24, a statistically significant time effect was found at T2 and T4 relative to T1 ($P < 0.001$) for subjective norms. Overall, at T2 subjective norms increased by 5.32% and at T4 subjective norms decreased by 35.57%. No significant group effect was found for subjective norms or time by group interaction. Therefore the B.A.R.T. intervention did not have a positive impact on subjective norms regarding risky and protective behaviours. The time

effects can therefore be attributed to baseline differences. As age increased by one year, the mean subjective norm score decreased by 1.06% ($P = 0.04$). Males had on average a 6.68% lower subjective norm score than females ($P < 0.001$) and Blacks learners had a 6.71% lower score than Coloured learners ($P < 0.001$).

E. Change in Self-Efficacy about Sexual Behaviour Over Time from T1-T4

Table 25. Learners' Total Self-Efficacy Scores from T1-T4, Showing Coefficients (95% CI) for Time, Group and Time by Group Interaction Differences ($n = 756$)

MODEL 1 Self-Efficacy	Coef.	Semi- Robust SE	P value	95% CI
Time Effects				
T2 vs. T1	22.57	1.37	<0.001	19.89, 25.26
T3 vs. T1	10.19	1.96	<0.001	6.34, 14.05
T4 vs. T1	6.27	2.68	0.02	1.01, 11.54
Group Effects				
I vs. C	-8.07	2.56	0.002	-13.10, -3.05
Time by Group Interaction	4.31	1.01	<0.001	2.32, 6.31
Age	-3.09	0.62	<0.001	-4.32, -1.87
Males vs. Females	-10.82	1.46	<0.001	-13.70, -7.95
Race				
Indian vs. Coloureds	5.06	3.87	0.28	-2.52, 12.64
Black vs. Coloureds	-4.03	1.76	0.02	-7.48, -0.57
White/other vs. Coloureds	11.63	3.58	0.001	4.59, 18.66

*T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control; SE-standard error
Gaussian family of distributions*

In Table 25, a statistically significant time effect was found at T2 ($P < 0.001$), T3 ($P < 0.001$) and T4 ($P = 0.02$) relative to T1 for self-efficacy. In T2 there was a 22.57% increase in self-efficacy, in T3 there was a 10.19% increase and in T4 there was a 6.27% increase in self-efficacy scores, irrespective of any group effects. Self-efficacy decreased by 8.07% in the intervention group compared to the control group and this difference was statistically

significant ($P = 0.002$), irrespective of time. This could have been an artifact of baseline differences. The time effect and group effect cannot be interpreted due to a statistically significant interaction effect. Self-efficacy score percent increased by 4.31% ($P < 0.001$), in favour of the B.A.R.T. intervention group. Therefore the intervention had a positive impact on self-efficacy to practice safer sex behaviours, as self-efficacy scores in the intervention group significantly improved over time relative to the control group. As age increased by one year, the mean self-efficacy score decreased by 3.09% ($P < 0.001$). Males had on average a 10.82% lower self-efficacy score than females ($P < 0.001$). Black learners had a 4.03% lower self-efficacy score than Coloured learners ($P < 0.02$) and White and other learners had 11.63% higher self-efficacy score than Coloured learners ($P = 0.001$).

F. Change in Intentions about Sexual Behaviours Over Time from T1-T4

Table 26. Learners' Total Intention Scores from T1-T4, Showing Coefficients (95% CI) for Time, Group and Time by Group Interaction Differences (n = 756)

MODEL 1 Intention	Coef.	Semi- Robust SE	P value	95% CI
Time Effects				
T2 vs. T1	4.19	1.30	0.001	1.63, 6.74
T3 vs. T1	-7.48	1.79	<0.001	-11.00, -3.96
T4 vs. T1	1.01	2.41	0.67	-3.72, 5.74
Group Effects				
I vs. C	-4.85	2.59	0.06	-9.93, 0.23
Time by Group Interaction	2.05	0.95	0.03	0.17, -3.92
Age	-0.55	0.59	0.34	-1.72, 0.61
Males vs. Females	-6.26	1.33	0.001	-8.87, -3.65
Race				
Indian vs. Coloureds	2.42	4.53	0.59	-6.46, 11.30
Black vs. Coloureds	-3.54	1.52	0.02	-6.53, -0.55
White/other vs. Coloureds	2.49	8.43	0.76	-14.04, 19.02

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control; SE-standard error Gaussian family of distributions

In Table 26, there were statistically significant time effects at T2 ($P = 0.001$) and T3 ($P < 0.001$) relative to T1 for intention scores, irrespective of group. Intentions increased by 4.19% at T2 relative to T1 and decreased by 7.48% at T3 relative to T1. No significant group effects were found for intention scores. The time effect cannot be interpreted due to a statistically significant interaction effect. Intention score percent increased by 2.05% over time, in favour of the intervention group ($P = 0.03$). Therefore the B.A.R.T. intervention had a positive impact on intentions for practice safer sex behaviour, as intentions significantly improved over time. Males had on average a 6.26% lower intention score than females ($P < 0.001$) and Black learners had a 3.54% lower intention score than Coloured learners ($P = 0.02$).

A statistically significant time by group interaction for all the determinants except subjective norms indicates a positive intervention effect of the B.A.R.T. intervention on most determinants of sexual behaviour. There was an increase in knowledge and self-efficacy, more positive AIDS beliefs and attitudes and greater intentions to change behaviours, more so in the intervention than the control group over time. The statistically significant time effects for subjective norms between T1-T2 and T1-T4 could not be attributed to an effect from the B.A.R.T. intervention as no interaction effect was found for subjective norms. Consistent changes in age, race and gender were also found. Males consistently had lower scores than females on all determinants of sexual behaviour. Further, older learners reported lower knowledge, attitudes, subjective norms, and self-efficacy scores than younger learners. Learners of Black origin had lower knowledge, beliefs, subjective norms, self-efficacy and

intention scores than learners of Coloured origin while learners of White origin had higher self-efficacy scores than learners of Coloured origin.

7.3. Discussion

The study was undertaken in the first decade of democracy. South Africa is a country in pursuit of peace and reconciliation, emerging after the confines of apartheid, only to meet head on the emergence and evolution of the AIDS epidemic. South African learners are therefore developing in a transitional society, while experiencing their personal developmental trajectory. Further transitions extend through the South African society in the educational system, the health system, the political system, the family and cultural systems, among others. It was against this background that the study was undertaken.

The positive behaviour change over time in terms of alcohol use at last sex draws support for the B.A.R.T. intervention as over twenty percent of learners were less likely to use alcohol at last sex in the intervention group than in the control group. This is an important outcome, as strong associations have been reported between alcohol use and sexual victimization among adolescent females as discussed in the baseline results (Champion *et al.*, 2004). The use of alcohol therefore increases risk of exposure to HIV, as protective behaviours are less likely to be practised, if under the influence of alcohol. The ripple effects of alcohol use in general and the subsequent negative consequences on sexual behaviour were therefore positively impacted by the B.A.R.T. intervention. The B.A.R.T. sessions included culturally relevant discussions

on rape in South Africa and the role of alcohol in sexual violence, which is in keeping with the positive outcome reported. Further, this outcome supports the goals of the South African school policy on drug and alcohol use which emphasizes preventative education to reduce the likelihood of experimentation with alcohol or drugs (Department of Education, 2002).

The continued rising HIV prevalence in South Africa especially among youth (Asamoah–Odei *et al.*, 2004; Abdool Karim and Abdool Karim, 2005; Shelton *et al.*, 2006) had prompted the researcher to initiate this intervention study, however the complexities involved in changing sexual behaviour practices was evident in the lack of an intervention effect reported for other protective behaviours over time. Learners' decisions to practice protective sex may therefore involve more than information, motivation and behavioural skills as provided by the B.A.R.T. intervention. This is further evidenced among the general youth population where access to condoms through national distribution campaigns, mass communication strategies or increases in VCT clinics (Abdool Karim and Abdool Karim, 2005) have also been unsuccessful in changing sexual behaviours. Abstinence behaviours, consistent condom use and reducing partners may therefore require more than interventions that target primarily cognitive processes to impact behaviour change.

These results are however not unusual as other researchers have reported similar findings in multiple intervention studies. For example James *et al.*, (2004) reported increased knowledge about HIV/AIDS among learners participating in the Life Skills' programme in South Africa

with no forthcoming change in behaviour. Walker *et al.*, (2006) also reported negative intervention effects among learners with regard to reduction in the number of sexual partners and the age of sexual initiation. However improvement on self-reported willingness to negotiate condom use, HIV prevention knowledge, self-esteem and attitudes towards HIV positive people was evident (Walker *et al.*, 2006). In a review of twenty-two school-based interventions, the authors concluded that school-based HIV/AIDS interventions can be successful in changing knowledge and attitudes but only certain behaviours, under specific conditions (Gallant and Maticka-Tyndale, 2004). Only two programmes in Tanzania (Klepp *et al.*, 1997) and Uganda (Shuey *et al.*, 1999) produced changes in sexual behaviours, particularly in the reduction of youth initiating sexual activity in the 13-14 year age groups. Among older learners in the 17.6 age group, changes in condom use but not sexual behaviour (i.e. sexual initiation or reduction of partners) improved (Gallant and Maticka-Tyndale, 2004). Further in a review of twenty-two school-based interventions, sixteen interventions had a positive impact on one or more reported behaviours and five interventions had a positive impact on two or more behaviours (Kirby *et al.*, 2006a). These behaviours included a decrease in sexual initiation (seven of eighteen studies), in frequency of engaging in sex (three of eight studies) and in the number of sexual partners (three of eight studies). Condom use behaviours increased in six of fourteen studies. Adult-led and peer-led interventions also had a positive impact on at least one or more sexual or protective behaviour. Therefore, the review demonstrates the challenges in behaviour change and that there is no single type of intervention that is effective (Kirby *et al.*, 2006b). Most interventions have the potential to be effective in some situations and not in others (Kirby *et al.*, 2006b) as was found in the Wentworth study.

Further even in the Ugandan study no significant changes in sexual behaviour were reported among learners who were already sexually active, suggesting that it may be more difficult to change behaviours of sexually active learners than those who were sexually inactive. This may also explain the findings of this study, as sexually active learners were included in the impact evaluation of condom use at last sex and reduction in partners in the past three months. Behaviour change among sexually active learners may therefore be more difficult to achieve and therefore targeting younger, sexually inactive, learners may yield better results in the long-term (Shuey *et al.*, 1999). However over sixty percent of learners in this study were sexually inactive and were also exposed to the B.A.R.T. intervention. This prevention intervention may have resulted in encouraging protective and preventative behaviours in these learners beyond the time frames of the study (Prochaska *et al.*, 1994). This is further evident in the positive intentions learners reported to practise protective behaviours more so in the intervention group than the control group in the determinant analysis.

Sexual behaviour is often not planned among young people and the consistent use of condoms at last sex may be an intention but not a very practical behaviour to achieve. The B.A.R.T. intervention focused on condom skills together with positive beliefs and attitudes regarding their use. Condoms were further accessible to all Wentworth learners at the community clinic or hospital. In a review of HIV prevention in developing countries, condom use was found to increase most when it was accessible, irrespective of whether they were distributed for free or available for sale (Merson *et al.*, 2000). A more positive change in the intervention group may have been forthcoming if condoms were available on the Wentworth school premises.

Learners' motives for condom use were not explored in this study however research suggests that these motives may influence decision making regarding their use. For example Gebhardt *et al.*, (2003) reported that motives for condom use that included pleasing their partners or coping with negative emotions, were negatively related to condom use, while motives to share intimacy were positively related to protective sex.

However overtime Wentworth learners may have moved from having no motivation to use condoms to internalizing condom use as part of their behaviour (Prochaska *et al.*, 1994). Some learners may have been in the precontemplation stage and had no intention to use condoms, while others may transition to a contemplation stage where they were thinking about condom use in the next six months. Others may be planning to change behaviour in the next month and others may have already used condoms consistently (action stage). The maintenance of condom use could however not be determined in the short period of this study (Prochaska *et al.*, 1994). Behaviour change therefore cannot be accurately measured within a time frame assigned for the purposes of research, i.e. fourteen months as in this study. In the contemplation period itself, change may take around six months, not forgetting the relapses between stages. Therefore had learners been followed over a longer time frame, more positive results may have been reported in favour of the B.A.R.T. intervention.

In support of the gradual process of behaviour change, among women in Baltimore and Philadelphia, behaviour change was not sustained even six months after the intervention (Cabral *et al.*, 2004). The B.A.R.T. intervention did not focus on a person's readiness to

change or stage of change, due to large sample size, however the theorist regards this process as essential (Prochaska *et al.*, 1994). For example, for people who are not yet contemplating consistent condom use, encouraging a step-by-step movement along the continuum of change may be more effective than encouraging them to move directly into action. Further, Dahrendorf's (1979) proposition in the Theory of Life Options explains that adolescents who have had more chances of a positive future avoided risky behaviours that predisposed them to HIV/AIDS compared to those with a less positive future. Long-term behaviour change is therefore a complex process dependent on multiple factors.

For sustained behaviour change, interventions need to provide continued support for maintenance of behaviours and to prevent relapse (Cabral *et al.*, 2004) which this research study did not have the capacity to implement. In addition, positive behaviour outcomes may have been jeopardized because many learners were not present for the intervention anyway, as indicated in the high drop-out percentages over the time period of the study. Further a number of resources protect against risk behaviours at an individual, family, school and community level. This includes self-esteem, internal locus of control, positive affect, family connectedness, academic achievement, parental education and religiosity (Zimmerman and Fergus, 2005). All these areas, except self-esteem, did not form part of the B.A.R.T. intervention and may have prevented a more positive outcome. From an ecological paradigm, individual behaviour change has to consider the interrelationship between the individual, the physical environment and the socio-cultural environment (Bartholomew *et al.*, 2001). Interventions that simultaneously influence these multiple levels and multiple settings may

therefore lead to greater and longer-lasting changes and maintenance of existing health-promoting habits (Bartholomew *et al.*, 2001).

The failure of the B.A.R.T. intervention to produce a statistically significant changes in the reduction of partners in the past three months, may be explained by the practice of having concurrent casual sexual partners as in much of Africa (South African Development Community, 2006). Epidemiologists have observed that Africans typically have two or three concurrent partnerships that overlap for months or years compared to serial monogamy, casual and commercial sexual encounters that occur everywhere (Halperin and Epstein, 2004). Therefore, as soon as one person in a network of relationships contracts HIV, everyone else in the network is placed at risk (Quinn and Sewankambo, 2000). Multiple partnerships is therefore a catalyst to the AIDS epidemic. 'Being faithful' implies monogamy, but also includes reductions in casual sex and multiple sexual partnerships (Halperin and Epstein, 2004). In the qualitative analysis learners often reported the importance of experimenting with many partners to improve coital prowess, especially among male learners.

Perhaps addressing cultural norms and practices that lie deep within the South African society, where abstaining from sex, being faithful to one partner and condomizing are not encouraged as aggressively as for example the 'Zero Grazing' (partner reduction and faithfulness) campaign of Uganda (Hogle *et al.*, 2002; Stoneburner and Low-Beer, 2004). The role models of societal leadership further discourage the practice of monogamy (Mthethwa, 2006) and the

practice of bearing children prior to commitment to a long-term relationship hinders abstinence behaviour and promotes experimentation with multiple partners (Leclerc-Madlala, 2002).

Many school-based HIV prevention programmes did not address the deeply ingrained cultural systems of the learners. There is therefore an urgent need to improve school programmes in order to address sexual risk behaviours of learners more appropriately (Flisher *et al.*, 2003) and to make a more dynamic impact on changes in behaviour. This may be a mammoth undertaking in view of the legacy of cultural belief systems that this multi-cultured society of learners have descended from. It is evident that interventions to reduce HIV risk-associated sexual behaviour among adolescents face many challenges, in addition to these challenges adolescents often feel invulnerable and further do not perceive themselves to be at risk (Jemmott and Jemmott, 2000; James *et al.*, 2004). Wentworth learners reported at baseline that having sex once without a condom did not place them at risk of HIV/AIDS, indicating that personal risk perception was low.

A further evaluation of the impact analysis of the determinants of sexual behaviour indicated a significant intervention effect in favour of the intervention group for knowledge, beliefs, attitudes, self-efficacy and intentions, but not for subjective norms. The lack of a statistically significant intervention effect for this determinant therefore indicates the influence of key role models in behaviour change. Subjective norms as indicated by the approval or disapproval of

sexual behaviour by parents, peers or religious groups were therefore identified as key components of the adolescent development process. Subjective norms were reported to be an important predictor of sexual behaviour among high school learners in Cape Town (Flisher *et al.*, 2003). In addition, a non-significant response for subjective norms may be the reason that there was minimum changes in behaviour for Wentworth learners in the impact analysis, in keeping with the Theory of Reasoned Action (Ajzen, 1991). More specifically the theory states that attitudes towards behaviour are determined by salient beliefs about that behaviour. In addition subjective norms, i.e. how important individuals or groups approve or disapprove of a behaviour and self-efficacy, i.e. perceived behavioural control, determine one's intention to change behaviour (Fishbein and Ajzen, 1975; Ajzen, 1985). In support of this theoretical framework, beliefs, attitudes, subjective norms and self-efficacy were significantly positively correlated with intentions, in the Wentworth study.

The important role of subjective norms in decision making about sexual behaviour is further explained by the social network theory (Odutolu, 2005) which describes social networks as being a vehicle for positive behaviour change. Social norm expectations by parents, peers or religious groups, together with gender expectations, create meaning and determine behaviour change (UNAIDS, 1999b). Acceptability is a strong expectation of every member of a social network and members comply with the norms of their social networks to remain welcomed as a member of the group (Odutolu, 2005). There is also the benefit of peer promoted self-efficacy, as the social network serves as a forum for promoting competencies (Odutolu, 2005).

Adolescents further seek approval and acceptance from key role-models, and fluctuate between friends, parents and religious obligations (UNAIDS, 1999a; Steinman and Zimmerman, 2004) as may be the case of learners in this study. Thus if learners accept the peer norm of engaging in risk behaviours, such as not using condoms or having multiple partners, this may increase the probability of continued risk behaviours (Flisher *et al.*, 2003). Conversely, if significant others such as one's parents, partners or peers disapproved of engagement in sexual intercourse or using condoms, adolescents may be less likely to engage in these behaviours (Jemmott *et al.*, 2002; Villarruel *et al.*, 2004).

The influence of subjective norms has also been reported to have a powerful influence on sexual decision making behaviours in other cultures globally. For example among Latino college students, the perception of normative support was a stronger determinant of intentions to use condoms than behavioural beliefs about the consequences of condom use (Jemmott *et al.*, 2002). Further, among Cambodian and Laotian adolescents, peers were the strongest predictors of risky sexual behaviour, which is consistent with many other research studies (UNAIDS, 1999a; Pearlman *et al.*, 2002; Le and Kato, 2006; Mash *et al.*, 2006). In fact peers were reported to exert substantial influence on youth beliefs and attitudes of what is appropriate behaviour (Le and Kato, 2006). Similarly, among Western Cape Anglican church youth, engaging in sexual activity was perceived to be due to peer pressure, the need to receive and give love and observing others having sex, rather than religious affiliation (Mash *et al.*, 2006). These findings are in keeping with the Social Cognitive Theory which proposes that individual behaviour is learnt through observation of models which includes models in the

social milieu, like parents, peers or religious leaders (Bandura, 1992). The B.A.R.T. intervention did not include these groups in the intervention however their inclusion may yield more positive changes in behaviour in future interventions.

The positive intervention effect for knowledge of HIV/AIDS was reported among Wentworth learners. An important foundation for any prevention efforts for young people is to provide them with basic information on how to protect themselves and their partners from HIV (Gallant and Maticka–Tyndale, 2004; Ross *et al.*, 2006). In a review of eleven school–based interventions among African learners, significant improvements in knowledge were produced in all but one school (Gallant and Maticka–Tyndale, 2004). Changes in knowledge were however not indicators of behaviour change. The assumption is that regardless of the high levels of knowledge about prevention strategies, young people may still engage in unprotected sex because they lack the skills to negotiate abstinence, reduce partners and use condoms. Therefore if young people possess adequate Life Skills, levels of risky behaviour should be lower (Ross *et al.*, 2006). However, the perception among learners that ‘it won’t happen to me’ (Reddy and James, 2001) is a major obstacle to behaviour change. In a study in KwaZulu–Natal learners found it difficult to accept facts about HIV as being relevant to them. As the lessons were repeated, learners felt they heard too much about HIV/AIDS and hence switched off from the topic of AIDS (Reddy and James, 2001). Wentworth teachers reported that learners received too much HIV information and hence became desensitized to AIDS. The effects on behaviour change may therefore require more intensive programmes, with an aim to reduce the gap between awareness and behaviour (James *et al.*, 2004).

Similarly, among high school learners in KwaZulu–Natal, the Laduma intervention, which included giving factual information on HIV/AIDS, no significant effect on behaviour change was reported (i.e. consistent condom use and reported sexual behaviours) however a significant impact on intentions to practice safe sex was evident (James *et al.*, 2005).

Wentworth learners reported a positive change in self–efficacy to practice protective sex overtime. The B.A.R.T. intervention had a positive impact on self–efficacy as it focused on skills training through role plays and modelling of different scenarios. Despite knowledge of protective and risky behaviours, learners may also engage in unprotected sex because they lack the skills to negotiate protective behaviours (Ross *et al.*, 2006). Self–efficacy or perceived behaviour control is therefore an essential component of any AIDS prevention effort. Perceived self–efficacy was reported to be linked to an increase in intentions to use condoms (Jemmott *et al.*, 2002). Similarly, high self–efficacy of condom use was positively related to lifetime and current condom use, and intentions to use condoms (Peltzer, 2000; Villarruel *et al.*, 2004). Sex education therefore needs to address the skills that young people need to have in order for them to be able to communicate their concerns and act confidently (James *et al.*, 2004).

The impact analysis of attitudes and beliefs of Wentworth learners showed a significant positive change in favour of the B.A.R.T. intervention overtime which was protective.

Attitude towards behaviour is seen as reflecting an individual’s beliefs about performing the

behaviour and the positive and negative consequences associated with engaging in the behaviour (Ajzen, 1991). Many research studies have reported inconsistent reports about attitudes and beliefs. For example in a review of five AIDS prevention programmes in Africa, adolescents' attitudes towards people living with HIV/AIDS changed positively in all programmes, however attitudes towards abstinence and condom use were inconsistent (Gallant and Maticka-Tyndale, 2004). Two studies with strong research designs recorded more positive attitudes towards abstaining from sex (Klepp *et al.*, 1997; Kinsman *et al.*, 2001). Among Latino adolescents the belief that their parents had high expectations of them and a belief in the importance of a good education were positively associated with abstinence or delays in sexual intercourse (Lammers *et al.*, 2000). However, in a sample of Mexican American learners of eleven to fourteen years of age, the belief in the importance of a good education and plans to stay in school were negative and significant predictors of intentions to have sex and past sexual behaviour (Lieboxitz *et al.*, 1999). Further, hedonistic beliefs or beliefs about the consequences of condom use for sexual enjoyment were viewed as negative consequences (Jemmott *et al.*, 1992b). Attitudes and beliefs regarding risky sexual behaviour choices vary between different cultures but were easier to change than actual behaviour. Further, older learners, especially males, held less positive attitudes than younger female learners, which indicated that AIDS prevention messages need to consider younger learners as discussed previously. Male Wentworth learners also held less positive beliefs and attitudes regarding risky and protective sexual behaviours than females in the impact analysis, which again emphasizes the need for greater focus on gender differences. Similarly, discrepancies in male and female learners' attitudes regarding condom use was also evident among rural high

school learners in KwaZulu–Natal and the authors recommend that this gender gap needs to be bridged (James *et al.*, 2004).

Wentworth learners' intentions to practice protective behaviours changed positively in favour of the B.A.R.T. intervention over time. Learners reported positive intentions to delay their first sexual experience until marriage or until they were mature enough to commit to a long–term relationship. Further they intended to have one sexual partner when they became sexually active and to use condoms consistently in the future. The study did not include follow–up of sexually inactive learners, which may yield improved behavioural outcomes in the future. The TRA framework adopted; emphasizes the need to continuously reaffirm beliefs, attitudes, subjective norms and self–efficacy of sexual behaviour so that intentions to change behaviours are maintained over longer time periods. James *et al.*, (2005) also reported that in the Laduma intervention a significant impact on intentions to practice safe sex was reported but no changes in behaviour were forthcoming.

The role of gender differences has been outlined in the impact analysis. In addition males held lower scores than females consistently across all determinants. Gender specific interventions therefore need to be revisited. Further targeting younger male learners with AIDS prevention messages deserves attention as older learners held lower knowledge, attitude, subjective norm and self–efficacy scores than younger learners. In terms of race, Blacks consistently held lower determinant scores than Coloured learners. In South Africa, stereotypes of each race therefore persist and may be harmful in terms of preventive interventions and programme

designs. The context in which adolescents face and make sexual decisions is therefore critical to consider in high HIV/AIDS prevalence settings like South Africa (Kaufman *et al.*, 2002). These findings also suggest that individual behaviour change theories has to be complemented by focusing on culture and traditions in Africa, as these environmental factors exert strong influences in sexual decision making (Oduolu, 2005; Delany–Moretlwe *et al.*, 2006).

In addition, the drop-out of learners from the intervention programme hindered prevention outcomes. In order for schools to effectively make an impact on the spread of HIV/AIDS, governments first have to get children to school and keep them there long enough to acquire basic literacy skills (Boler and Jellema, 2005). Recent studies indicated that young people with little or no education may be twice as likely to contract HIV as those who have completed primary education (Boler and Jellema, 2005). Dropping out from AIDS prevention interventions undermines efforts to achieve more than basic literacy for learners (Sibanda, 1996). In the Wentworth study there was a high frequency of drop-out of learners over the four time points of the assessment. These drop-outs failed to complete the assessment, were absent from sessions or did not return to school in the new school year. However, the South African Schools Act endorses the early drop out of learners as it is not compulsory for Grade 9 learners to attend school. Policy changes therefore need to be addressed in order to ensure learners remain in schools and derive the benefits of AIDS prevention programmes (South African Government, 1996b). This finding is significant in terms of AIDS prevention, as unsafe sexual behaviour was found to be predictive of an increased drop-out rate (Flisher and Chalton, 1995; Odum and Drolet, 1997; Walker *et al.*, 1998; Shisana and Sibayi, 2002; Reddy

et al., 2003). Findings among high school learners in Cape Town revealed that Grade 8 learners who had experienced sexual intercourse or who had engaged in unsafe sexual behaviour were more likely to drop-out of school before Grade 12 compared to their counterparts who remained in schools (Flisher *et al.*, 2005). Further, studies have reported that dropping out of school is a risk factor for various forms of substance abuse, together with violent behaviour (Flisher and Chalton, 1995).

School-based HIV interventions, as in this study therefore cannot reach young people that do not go to school, are frequently absent or drop-out of school (Santelli *et al.*, 2006). Poor academic performance, pregnancy, poverty, previous inequitable state expenditure and other social ills though not the focus of this study, are reported in literature as underlying factors contributing to high drop-out rate among learners in South Africa (Flisher and Chalton, 1995; Santelli *et al.*, 2006). Learners that dropped out of the study, therefore negatively impacted the intervention effects. The lack of a culture of learning among many learners in these public schools also may have impacted on the study outcomes negatively.

7.4. Conclusion

The B.A.R.T. intervention was based on cognitive theoretical models which are regarded as being essential for successful intervention outcomes (Kirby, 2000). It produced statistically significant outcomes on all five determinants of sexual behaviour except subjective norms. An intervention effect was reported for one behaviour outcome, namely alcohol use at last sex

with no changes reported for ever had sex, condom use at last sex and reduction in partners in the past three months. Other research studies have supported the outcomes of this study and have consistently reported fewer behaviour changes together with more changes in determinants. Further in a review of school programmes that targeted older learners, none was able to effect a change in sexual behaviours like abstinence and number of partners, however an increase in condom use was reported in one programme (Harvey *et al.*, 2000). The B.A.R.T. intervention targeted high school learners many of whom were already practising high risk sexual behaviours which are difficult to change (Grisurapong, 2006). HIV prevention interventions are reported to be more effective, particularly among young, sexually inactive people, because their negative behavioural patterns are not firmly established and positive behaviour can then be reinforced (UNAIDS, 1998; Shuey *et al.*, 1999).

In order to truly affect HIV prevalence, schools have to move beyond increasing knowledge alone to demonstrating significant and sustained improvements in sexual risk behaviours. This can be achievable by addressing values, attitudes and perceived norms about sex and condom use through skills-based training of learners (Kirby *et al.*, 2006b). The study acknowledges that behaviour change has been difficult to achieve even in larger studies described globally (Gallant and Maticka-Tyndale, 2004). Further, there is no single type of intervention that is effective to produce behaviour change as most have the potential to be effective in some situations (Kirby *et al.*, 2006b). A major challenge in reducing the spread of HIV among youth in South Africa is designing behaviour change interventions that bridge the divide between individual models of behaviour change and also focus on broader social issues

(Delany–Moretlwe *et al.*, 2006). Issues of gender and race together with the drop out of learners from the study are issues of context that deserve further attention in future research studies. The role of parents, peers and religious groups in influencing sexual behaviours cannot be overstated.

Chapter 8: Limitations

Every research study though conducted with scientific precision and consideration of all elements of the research process is susceptible to limitations. An overview of these limitations is presented below:

1. A pre-test /multiple post-test intervention design was undertaken. As such the design was innovative. However, data analysis posed many problems as the researcher tried to find a robust model for the longitudinal analysis, in order to reduce bias. Data analysis took longer than expected, as consultations had to be made with many statisticians to determine the best way to undertake the analysis. A total of four statisticians* were consulted before the final data models were decided on.
2. The drop-out of learners' overtime is one of the major limitations of this study. Drop outs were defined as learners who had not completed all four questionnaires. Between T1-T3 37.6% of learners dropped out of the study with statistically significant differences reported between the intervention and control groups ($P < 0.001$). Between T1-T2 and T1-T4 there was a 12.6% and 60.4% drop-out rate respectively but there were no statistically significant differences reported between intervention and control groups. Learners' turnover, in terms of drop-out rates included those that were absent from the programme and hence these learners could not be followed through for the duration of the study. The learners that missed sessions, may have been at higher risk of practising unprotective sex, but were not present at all sessions to derive benefits from the intervention.

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3. This research was conducted in Wentworth, which is an urban area. Learners were predominantly Black and Coloured while Indians and Whites were under-represented in the sample. As a result generalizations of the results to rural areas and to the White and Indian race groups are cautioned. However, as the learners that attended these high schools included many learners from surrounding areas outside the Wentworth community, the sample is representative of many high schools in South Africa, where learners attend schools outside their areas of residence. Therefore the study has some generalizability to other high school populations in South Africa.
4. One important limitation of behavioural interventions is that all behavioural outcomes were self reported. Given the sensitivity of self-reported measures learners may have consciously or subconsciously misreported behaviours in ways they consider to be socially desirable (Auerbach and Kandathil, 2006). It is therefore possible that young people may be reluctant to reveal information about their sexual activity, and may have reported socially acceptable responses. Further, young people generally vacillate between moods and decisions, and this raises questions about the validity of results. However, it is not possible to directly observe and measure HIV risk and protective sexual behaviours in any other way. Self reported measures have however been supported by South African research, and internal consistency in data from various studies has been observed (Abdool Karim and Abdool Karim, 2005). To increase validity of self-reports of behaviour, confidentiality was assured using various measures. To reduce inaccuracy of self-reported measures, adolescents were asked to recall their behaviours over a relatively short period of three months (Jemmott and Jemmott, 2000). The inclusion of biological markers including STI or HIV incidences in studies of behavioural interventions is therefore

recommended as a complementary measure. However this has cost implications which this study could not afford.

5. The structural environment of the schools was a limitation of the study as the questionnaires had to be completed in crowded classrooms or in school halls, where chairs were limited, and acoustics were poor. Facilitators assisted to ensure conditions of anonymity were maintained although it was challenging to enforce.
6. The behaviour of some learners in Wentworth schools is a limitation to the intervention. These learners would deliberately disrupt sessions, wander around the school and smoke in the toilets during the session time. There was therefore general apathy among many learners to the process of learning. Implementation of the intervention was therefore very challenging. The findings of the study may therefore be biased as the intervention could not be implemented at an optimal level. In reality this lack of a culture of learning is evident in many South African schools (Coombe, 2000).
7. Threats to validity were a limitation of this study including:
 - a. History: During the project, other community organizations entered schools and did once off HIV/AIDS educational programmes, but this occurred in both intervention and control schools. Learners were also exposed to HIV/AIDS messages from the media. In addition, the HIV/AIDS Life Skills' programmes that learners had experienced were also a threat to validity, as the strength of its implementation depended on the teacher's competence. Some teachers may have introduced audiovisual information into the programmes, while others may have used conventional methods of teaching, like group work or a class discussion. All these effects cannot be controlled for unless in a laboratory.
 - b. Testing: Earlier measurements can affect the results of later measurement. In operations research, testing is an important confounding factor when changes in behaviour are studied

over time. Repeated testing may alter the individual's response to testing as they may be less patient to answer the same questions as completely and accurately in the second and third rounds, than in the first survey.

c. Differential mortality: In cohort studies where the same group of people are followed over time, there is almost always some drop-out or loss of cases, therefore the results in the study may be affected by the differences in respondents rather than the programme intervention.

The limitations in this study are consistent with many other similar interventions and the key areas identified require intensive scale-up in future programme designs.

Chapter 9: Conclusions and Recommendations

Objective 6. To make recommendations for educational policy and AIDS prevention agendas for youth

School-based interventions that target learners can be successful in reaching large populations of learners with HIV/AIDS prevention messages and in changing knowledge and attitudes among other determinants and in some cases behaviour. It is no doubt challenging to implement HIV/AIDS prevention strategies in resource constrained settings such as schools in South Africa however the cycle of increasing incidence and prevalence of HIV/AIDS and increased mortality due to AIDS (Roos *et al.*, 2006; UNAIDS, 2006) needs to be broken.

The study was based on a sound conceptual framework which is recommended as the gold standard for AIDS prevention interventions (Kirby *et al.*, 2006b; UNAIDS, 2006). The adaptation of the B.A.R.T. intervention to include culturally relevant material drew emphasis to the importance of contextual as well as individual factors in influencing behaviour change. The B.A.R.T intervention was generally well accepted by learners and it would be more feasible to be implemented by health professionals with adequate financial and infrastructure support, given the high work loads of teachers and the rapid turn over of peer leaders.

The pre test/multiple post test study design allowed for the evaluation of the effects of the intervention in terms of time, group and in a time by group interaction. This ensured that all factors were given consideration in one robust statistical model.

In the qualitative analysis focus group discussion drew emphasis to the themes of sexual experimentation among learners, together with incorrect beliefs and attitudes towards HIV/AIDS. Males were particularly prone to sexual experimentation with risky behaviours. These discussions revealed much about the social environment and behaviour practices of learners. Further interviews with teachers highlighted the many gaps they experience in implementing the LHAP (Life Skills' HIV/AIDS Programme) together with the lack of an effective monitoring and evaluation system. Resource constraints in schools, large learner-teacher ratios, inadequate training on the curriculum and discomfort in discussing sexually explicit information with learners, were some of the hinderances to the programme. These areas need to be addressed by the Department of Education if the programme is to produce any sustainable positive outcomes in learners.

The baseline evaluation highlighted the high exposure of learners to risky sexual behaviours including the early age of sexual initiation, coercive sex, preference for older partners and receiving money or gifts for sex among other behaviours. The consequences of these included teenage pregnancies and the prevalence of STIs. Learners did however practice protective sex at baseline and reported a high percentage of condom use behaviour. Sexual risk behaviours however do not operate in isolation but are part of a larger system that interacts with each other. Engaging in one risky behaviour may therefore lead to ripple effects in other risky behaviours. Gender differences indicated that male learners were more prone to high risk behaviours than females and they initiated sex at an earlier age than females. The highly volatile nature of the baseline analysis further confirmed the need for prevention intervention among these learners, given the reports of multiple risky behaviours. The legislation of

policies and programmes to target gender specific groups with AIDS prevention messages is imperative.

The impact analysis revealed an intervention effect for alcohol use at last sex, but no intervention effect for other behaviours of ever had sex, condom use at last sex and reduction in partners in the past three months. Sexual risk behaviours is compounded by the abuse of alcohol which has further repercussions in promoting the spread of HIV/AIDS (Jessor and Jessor, 1977; Stewart *et al.*, 1999; Bachanas *et al.*, 2002; Champion *et al.*, 2004). Therefore the positive impact of the B.A.R.T. intervention on alcohol use at last sex is an important outcome. Further an intervention effect was reported for knowledge, beliefs, attitudes, subjective norms and self-efficacy however no intervention effect was reported for subjective norms. The important role of subjective norms in behaviour change is supported by research which reported that people do not behave in isolation from their environments (Oduolu, 2005). In particular Africans are especially not individualistic and their actions are guided by social norms and traditional practices which have to first be accepted by these communities (Oduolu, 2005). This is in keeping with the finding among learners in this study. Changes in determinants rather than behaviours are reported consistently in the literature reviewed in many other studies. Behaviour change especially among adolescents seems more difficult to achieve given the rapid transitions of this developmental stage. South African learners also had to cope with finding their identity in a transitional society and this was an additional constraint on behaviour change.

Many theoretical models are presented to gain a better understanding of the findings. The TRA and the Stages of Change Model best describe the outcomes. Protective subjective norms governing sexual behaviours need to be strengthened so that together with attitudes, beliefs and self-efficacy, there would be greater intentions to change sexual behaviour in a positive direction. The lack of a statistically significant intervention effect for subjective norms indicates the important role that subjective norms play in steering learners forward towards greater intentions to change behaviour. Behaviour can be shaped by social networks and these networks can influence and transfer new behaviours. The shift of AIDS prevention interventions to a community level, by including parents, peers and religious groups and other leadership, has the potential to reach large numbers of people in a cost effective manner, especially in resource constrained settings (Odotolu, 2005). The inclusion of these groups was lacking in this study.

Conversely learners may be at different stages of change and therefore require a longer time period to demonstrate positive changes in behaviour. Learners are further diverse and one cannot expect similar behaviour changes to be displayed by all learners in the 14 months duration of the study. In fact behaviour change may be forthcoming beyond the time frames of the study.

The study outcomes were however confounded by the school environments in terms of the drop out of learners from the intervention. These learners were not present to derive the

benefits of the intervention and were not evaluated. If AIDS prevention programmes are to be effective they require intensive multi–sectoral and multi–disciplinary approaches to ensure learners remain in schools and derive the benefits of prevention interventions.

The study has been valuable in identifying drivers of the high HIV/AIDS prevalence among youth in South Africa. These include social norms that do not promote protective sexual behaviours, gender stereotypes that perpetuate the dominating role of males in sexual decision making, the high drop-out rate of learners from AIDS prevention interventions and the lack of a culture of teaching and learning in South African schools.

The following recommendations can be drawn from the study:

1. Peer groups, parent groups and religious groups need to be integrated into school– based HIV/AIDS prevention programmes. The vital role of these groups in promoting positive protective messages to learners is imperative, to move learners towards behaviour change. This strategy is feasible through the coordination and inclusion of existing community structures, such as women’s groups, churches and other religious groups, parent groups and youth groups; by school governing bodies into AIDS prevention programmes. Social norms are the foundation of a society and dictate how we relate to each other. Therefore steering these norms to more protective norms governing sexual behaviour may be the way forward in preventing the spread of HIV/AIDS.
2. Targeting gender specific groups should incorporate HIV prevention messages specific for males and females, including identifying risk factors for coercive sex in females and challenging gender norms among men regarding the ‘acceptability’ of coercive sex. Further,

gender sensitive training of male and female learners as peer educators is recommended to close the gap in gender differences regarding risky sexual behaviours.

3. Youth need to have access to adequate mechanisms in communities to report sexual assault and receive appropriate supportive services. Teachers and other adults that exploit learners sexually should endure swift action by police and disciplinary action and expulsion by the Department of Education. In addition, self-defence should be incorporated into the Life Skills' programme, as learners become more prone to rape and abuse in homes, communities and schools than ever before. Increased safety and security measures need to be in place in all communities and schools, including surveillance systems and patrols. In addition, the South African government needs to institute judicial systems that facilitate and protect the human rights of sexually abused children, remove obstacles that hinder prosecution and legislate adequate sentencing for perpetrators of sexual crimes.

4. There should be greater collaboration between government departments, NGOs and health professionals to implement preventative programmes to address alcohol and drug abuse and the increased risk of engaging in high risk sexual behaviours.

5. Professional school counselling services should be made available to learners by the Department of Education by creating infrastructure onsite to address social and psychological issues learners face daily. Inclusive of which is the employment of school social workers and psychologist, so that they are accessible and available to every school to counsel learners. Presently schools have to access the services of hospital social workers and the Department of Welfare social work services. These departments already have extensive caseloads from

society at large. In addition, accessing school psychological services has been a battle for teachers*, as they do not respond at all or have a delayed response time.

6. Teacher led interventions are logically the easiest to implement, however, given their work load health workers and/ social workers maybe better trained to teach LHAP given their skills to deal with this sensitive curriculum. Peer educators have also been advocated to implement AIDS prevention curriculum however they require the skills and training to be successful. The high turnover of students and the requirements for recurring training and supervision implies that peer educators are not sustainable and cost effective.

7. The 'silence' surrounding high risk sexual practices such as concurrent sexual partners, intergenerational sex, the exchange of money or gifts for sex and polygamy, needs to be broken. Mass media campaigns should refocus prevention messages on these practices. The present AIDS prevention messages are often ambiguous and center on the 'ABC' strategy. Abstinence and being faithful to one partner should be prioritized, and promoted aggressively, while information on condoms should also be given. Learners need to be given the freedom to make informed decisions regarding their sexual health.

8. All health facilities, including hospitals and clinics, should institute comprehensive prevention programmes for the community they serve, as an essential component of a national health promotion and HIV/AIDS prevention strategy. Youth friendly reproductive health centres should be located within school environments and other accessible sites.

9. Schools should adopt more vigilant measures to reduce drop-out of learners from classes and school interventions especially while they are present at school. School and neighbourhood patrols should be adopted by the Department of Education, to ensure learners go to school and remain in class sessions. Absenteeism should be monitored through these

* O.Gous (personal communication, March 14, 2004).

personnel who should conduct home visits to frequent absentees. The researcher advocates for the institution of 'trauncy' officers at each school. Assessment and interventions should therefore extend beyond the school environment into communities that the schools serve, so that drop outs can be targeted and included in prevention interventions.

10. AIDS prevention interventions can also address the reduction of stigma attached to HIV/AIDS among learners. HIV infected learners can derive the necessary support they deserve in a compassionate and caring school environment, while remaining in the school instead of dropping out of school, for fear of stigmatization and victimization.

11. In order for schools to effectively make an impact on the spread of HIV/AIDS children have to remain in schools to acquire literacy and exposure to healthy life style messages. The school environment should incorporate an ethos of learning. Every effort needs to be made to restore standardized teacher training of the highest quality, together with adequate human and material resources to support the teaching of LHAP. Teachers need to participate in regular training updates by experienced and competent health professionals on HIV/AIDS. Teacher training institutions should also incorporate reproductive health topics into the training curriculum.

12. Initiation of an increase in learner supervision by parents, aftercare programmes organized at school or in nearby community settings, so that there is less opportunity for sexual risk-taking behaviour. The school day can be extended to incorporate academics for half the day and an extensive sporting and extracurricular programme thereafter. This would ensure parents and learners finish the day at similar times.

13. There is strong evidence to suggest that AIDS prevention interventions, based on formal theory, have greater potential to be effective and to lead to generalizability of outcomes than

those based on informal conceptual and logical grounds (Fisher and Fisher, 1992). Further, the sensitive nature of the Life Skills course requires forethought and planning through a consultative process with education specialists, health promotion planners, medical and psychological personnel.

14. The fact that the majority of Wentworth learners were not sexually active indicates that many were not engaging in risky sexual behaviours. Interventions at a younger age should therefore target sustaining these abstinence behaviours and postponing early sexual initiation.

15. The most appropriate or effective manner to implement interventions for youth is to consider developmental stage and setting (Speizer *et al.*, 2003). Implementing multicomponent interventions that influence multiple risk and protective factors may be needed in order for large and sustained behavioural impacts to be realized (Speizer *et al.*, 2003).

16. There are ethical issues of whether or not to hold programs for youth in resource-poor settings and in populations with high mobility of youth, as in this study. Difficulties in programme implementation and loss to follow-up remain. However these challenges need to be addressed, given the urgency of the epidemic.

17. The Department of Health has taken a positive step by introducing the HIV/AIDS and STIs, Strategic Plan for South Africa 2007-2011 (Department of Health, 2007). The plan advocates the revision of behaviour change approaches, and has incorporated human and legal rights, monitoring and surveillance, prevention, intervention, care and support as priority areas (Department of Health, 2007). Much of the media campaign focuses on 'Taking Your Relationship to the Next Level' by getting tested. A campaign that promotes Voluntary Counselling and Testing (VCT) is valuable in terms of accessing risk reduction messages and antiretroviral drugs (ARVs), but is targeted at those who are practising risky sexual

behaviours. At the opposite end of the continuum is a proactive approach of building value systems that ultimately would promote risk reduction strategies and more responsible choices in terms of sexuality. The national media strategy therefore requires refocusing.

18. In the light that intervention effects in this study might be short-term or transitional in nature there is a need to ensure the durability of behavioural effects (Speizer *et al.*, 2003).

Further behavioural effects need to complement epidemiological data.

19. Further strong political leadership and political role-models should steer AIDS prevention efforts forward, in South Africa.

20. The study reiterates the recommendations for successful interventions as described in the literature review (St. Lawrence *et al.*, 1995) and the study methodology:

- a. A conceptual foundation grounded in social learning theory,
- b. Equal emphasis on abstinence and on lowering risk behaviour rather than promoting abstinence as the only option,
- c. Involvement of participants in active, rather than passive learning,
- d. Equipping learners to counter peer and social pressures into sexual activity,
- e. Offering alternatives for unprotected intercourse through abstinence, condom use or avoiding risky situations,
- f. Provision of specific skills training through modelling and communication skills that are developmentally appropriate and culturally relevant for their intended recipients.

The study has highlighted that HIV/AIDS prevention cannot be regarded as a biomedical or a behavioural issue alone, as social and community factors also play a role (Campbell and Mzaidume, 2002). The youth of South Africa are no doubt trapped in risky sexual behaviours

which pile on top of each other in a morass of dictating gender norms and coercive sex (Frank *et al*; 2008). As a democratic society we must give priority to the human rights of our children; also of paramount importance is the maintenance of our norms and values, which are the foundations of our society (Frank *et al*; 2008). The co-ordinated participation of stakeholders at all levels of society is essential to produce a local and national impact on the escalation of HIV/AIDS in South Africa. It is hoped that this research study prompts policy makers to review existing systems, structures and policies and move towards new strides in AIDS prevention efforts for youth. The findings should also challenge researchers to revisit the design of AIDS prevention interventions to incorporate important elements that promote and sustain protective sexual behaviours for youth. Risky sexual behaviours are symptomatic of a society in crisis (Frank *et al*; 2008).

'Every minute that passes, another child under 15 dies of an AIDS-related illness and another four young people aged 15–24 become infected with HIV. This simply does not have to be'.¹

¹ UNICEF & UNAIDS, *A Call to Action: Children, the missing face of AIDS*, October 2005

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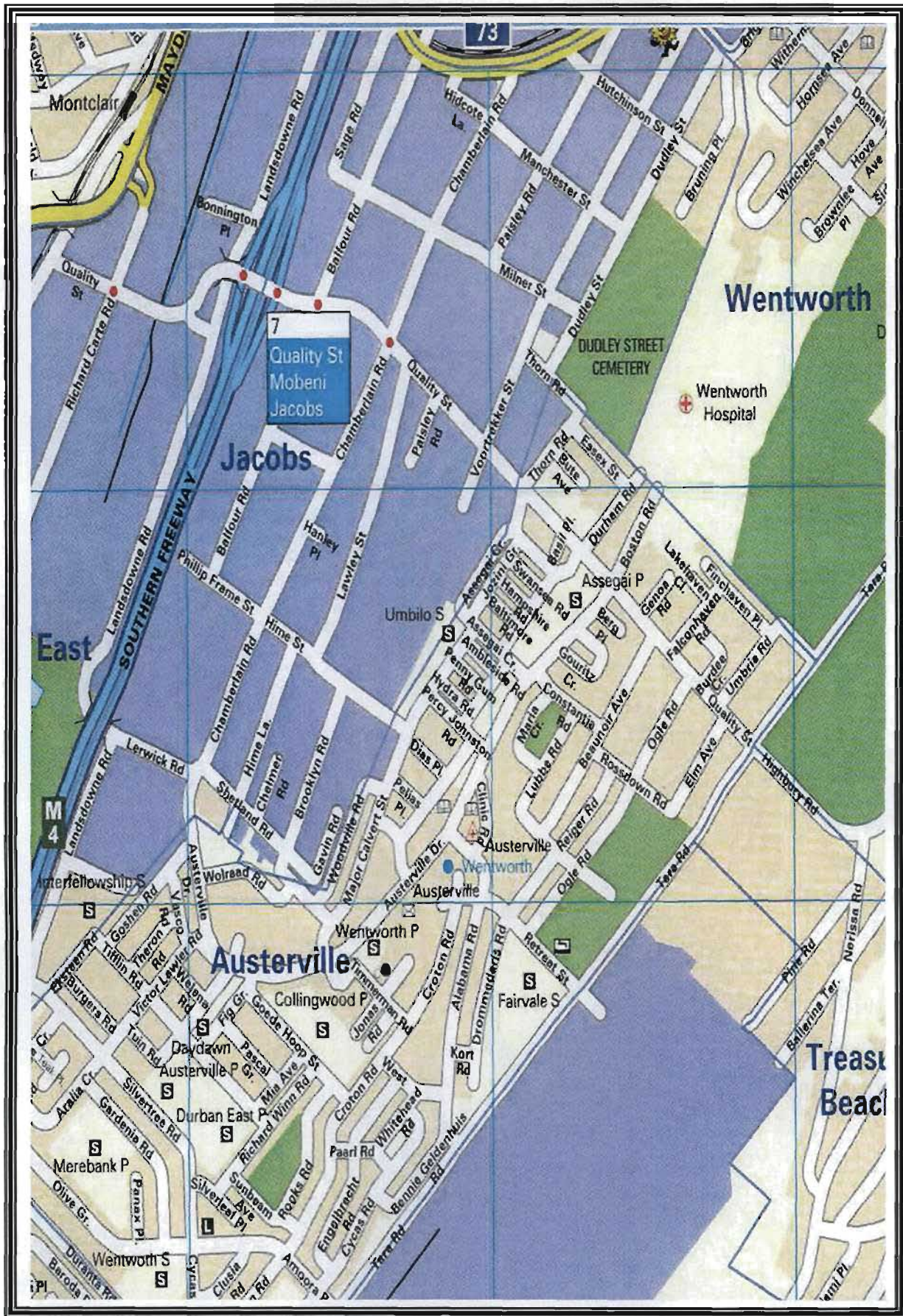
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Appendices



Appendix 1. Map of Wentworth

Appendix 2. Letter of Ethical Approval

MEMORANDUM

To: Professor C C Jinabhai
Community Health
Nelson R Mandela School of Medicine

From: Professor J Moodley
Chairman: Research Ethics Committee
Nelson R Mandela School of Medicine

25 November 2003

PROTOCOL : A HIV/AIDS preventative strategy among adolescent school-going children, in South Africa. S Frank, Community Health. Ref.: H044/03



The Research Ethics Committee and the Higher Degrees Committee considered the abovementioned application and made various recommendations. These recommendations have been addressed and the protocol was approved by consensus at a full sitting of the Research Ethics Committee at its meeting held on 25 November 2003. This approval is valid for one year from this date. To ensure continuous approval, an application for recertification should be submitted a couple of months before the expiry date.


PROFESSOR J MOODLEY
Chairman: Research Ethics Committee

c.c. Mrs S Frank – e-mail serenaf@webmail.co.za
Mrs L Adendorff, Postgraduate Education

Appendix 3. Letter of Approval from the Department of Education

16 MAY 2003 9:27 NO. 118 P. 2

	PROVINCE OF KWAZULU-NATAL ISIFUNDAZWE SAKWAZULU-NATAL PROVINSIE KWAZULU-NATAL		DEPARTMENT OF EDUCATION AND CULTURE UMNYANGO WEMFUNDO NAMASIKO DEPARTEMENT VAN ONDERWYS EN KULTUUR
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NORTH DURBAN REGION		ISIFUNDAZWE SENYAKATHO NETHEKU		NOORD DURBAN STREEK	
Address: Indrefi: Adres:	Truro House 17 Victoria Embankment Esplanade	Private Bag: Isikhawama Sepost: Privaatposak:	Private Bag 254320 Durban 4000	Telephone: Ucinca: Telefoont: Foon:	(031) 360-4811 (031) 337-4241
Enquiries: Imibuzo: Navraag:	MR V MGOZI	Reference: Inkombuzo: Verwysing:		Date: Usinca: Datum:	13 MAY 2003

Mrs SV Frank
Wentworth Hospital
Private Bag Jacobs
4026

Dear Mrs Frank

REQUEST TO CONDUCT RESEARCH AT WENTWORTH SCHOOLS

1. Receipt of your correspondence dated 09 May 2003 is acknowledged.
2. Permission to conduct research in Wentworth schools is granted with a proviso that:
 - The School Governing Body and Management are in agreement.
 - Teaching and Learning time is not compromised.
3. Wishing you all the success in your endeavours.


MRS N. MTULI
REGIONAL SENIOR MANAGER

cc District office

Appendix 4. Letters of Approval from Study High Schools

18-11-2003 09:59

P.01



FAIRVALE SECONDARY SCHOOL

Telephone: 468 4409 Fax: 468 6582 Private Bag X07 Austerville 4005

18 November 2003

To Whom It May Concern:

RE : HIV YOUTH INTERVENTION

On behalf of School Governing Body and staff, permission is granted to conduct the above project at this school.

A handwritten signature in cursive script, appearing to read 'P.G. Bishop'.

P.G.BISHOP
PRINCIPAL

TELE P.01



Umbilo Secondary School

Cnr. Assegai Crescent
& Major Calvert Street
AUSTERVILLE 4052
Fax: (031) 468 2713

P. O. Box 14329
AUSTERVILLE
4005
TEL : (031) 468 6520 / +61 4543

18 August 2003

Ms S.V. Frank
Chief Social Worker
Wentworth Hospital

Tel: 031-4605084
Fax: 031-4689654

RE: COMMUNITY YOUTH INTERVENTION

On behalf of the staff and governing body, I give you permission to conduct your study at the above school

Yours in education.



MR B.J. MULLER
Principal



MRS A. BROWER
Educator



Umbilo Secondary School

Cnr. Assegai Crescent
& Major Calvert Street
AUSTERVILLE 4052
Fax: (031) 468 2713

P. O. Box 14229
AUSTERVILLE
4005
TEL : (031) 468 6530 / 461 4543

18 August 2003

Ms S.V. Frank
Chief Social Worker
Wentworth Hospital

Tel: 031-4605084
Fax: 031-4689654

RE: COMMUNITY YOUTH INTERVENTION

On behalf of the staff and governing body, I give you permission to conduct your study at the above school

Yours in education.


MR B.J. MULDER
Principal


MRS A. BROWER
Educator

Appendix 5. Informed Consent by Parents

Dear Parent,

Hi, My name is Serena Frank. I am a social worker at Wentworth Hospital.

I will be conducting a HIV/AIDS programme in the three High schools in Wentworth. Ethics approval has been granted from the University of Natal, Nelson Mandela School of Medicine, and Research Ethics Committee (Reference No. H044/043).

The programme is aimed at informing your child on sexual risk behaviour, offering him/her behaviour skills to prevent the spread of HIV, like assertiveness skills, and motivating your child to prevent the spread of HIV/AIDS, sexually transmitted diseases, teenage pregnancy, alcohol and drug addiction, etc., through safer sex and abstinence messages.

The programme will involve the completion of questionnaires, role-plays, group discussions, video presentations, etc. and is therefore highly interactive. Research indicates that learners can prevent the spread of HIV/AIDS if they are given correct information, behaviour skills and are adequately motivated.

The programme will in no way harm your child. All information collected in the questionnaires will be anonymous and will be used to plan and evaluate future educational programmes for learners in schools. Medical personnel like nurses and myself, a medical social worker, will also be involved in this project.

As it is a pilot project, only the Grades 10 learners in all high schools have been selected. Your child will gain the confidence to protect themselves against HIV/AIDS and transmit information to peers and community members regarding HIV/AIDS.

The programme will be run during school-time for about 3.5 months. The programme will therefore not interrupt your child's school work.

If you would like your child to participate in this project please sign this consent form. Your child will not be included in this programme without your written consent. If you do not decide to include your child in this project, there will be no adverse or negative consequences from the teachers, school, clinic nor the hospital.

I Parent/Guardian of..... hereby consent/refuse to consent, to my child....., participating in this HIV/AIDS Life Skills' training programme.

Parents Signature:..... Witness.....

Yours Sincerely

S.V. Frank (Mrs.),
Chief Social Worker,
Wentworth Hospital
Date.....

Appendix 6. Informed Consent by Learners

Dear Learner,

I am a medical social worker at Wentworth hospital. I will be conducting a HIV/AIDS programme in the three High schools in Wentworth. Ethics approval has been granted from the University of Natal, Nelson Mandela School of Medicine and Research Ethics Committee (Reference No. H044/043).

The programme is aimed at informing you on sexual risk behaviour, teaching you behaviour skills to prevent the spread of HIV, like assertiveness skills, and motivating you to prevent the spread of HIV/AIDS, sexually transmitted diseases, teenage pregnancy, etc., through safer sex and abstinence messages.

The programme will involve the completion of questionnaires, role-plays, group discussions, video presentations, etc. and is therefore highly interactive. The questionnaires will involve details of sexual behaviour and practices. Research indicates that learners can prevent the spread of HIV/AIDS if they are given correct information, behaviour skills and are adequately motivated.

The programme will in no way harm you. All information collected in the questionnaires will be anonymous and will be used to plan and evaluate future educational programmes for learners in schools. Your input is therefore invaluable.

Medical personnel like nurses and myself, will be involved in this project. I will also be involving members of the Wentworth AIDS Action group in the project as co-leaders.

As it is a pilot project, only the Grades 10 learners in all high schools have been selected. You will gain the confidence to protect yourself against HIV/AIDS and transmit information to peers and community members regarding HIV/AIDS.

The programme will be run during school-time for about 3.5 months. The programme will therefore not interrupt your school work.

If you would like to participate in this project please sign this consent form. You will not be included in this programme without your written consent. If you do not decide to be part of this project, there will be no adverse or negative consequences from the Teachers, school, clinic or the hospital.

Ihereby consent/refuse to participating in this HIV/AIDS Life Skills' training programme.

Learners Signature:

Yours Sincerely

S.V. Frank (Mrs.)
Chief Social Worker
Wentworth Hospital
Date.....

Appendix 7. Information given to Participants

This is a project that will involve your participation in the completion of questionnaires, participation in group sessions, listen to talks, watch videos, etc. The project will focus on sexual behaviour among adolescent children. You may have heard of HIV/AIDS, well, the project is aimed at preventing the spread of this dreadful disease. Your input and participation in the project will be totally confidential. The results of this project will assist in the development of a comprehensive programme regarding sexual education for all scholars. The programme is the first of its kind to be piloted and as such you will receive a lot of training and valuable input that would assist you to be leaders and a positive influence among your peers. At the end of the programme you will be asked to evaluate the project and will be given certificates for completion of the project. The results of the project will be made available to all schools. Your participation and input is valuable.

Appendix 8. Interview Schedule for Focus Groups

1. What are your beliefs and attitudes about prevention of HIV/ AIDS?
2. What is your individual response to AIDS?
3. How do you feel about abstaining from sex until marriage?
4. Would you use a condom and why?
5. What are your views on multiple sexual partners?

Appendix 9. Semi Structured Questionnaire for Teacher Interviews

1. Describe your involvement in Life Skills' training?
2. Describe the type of training you have received in LO with specific reference to HIV/AIDS?
3. Describe whether you have any other personal training in HIV/AIDS?
4. Elaborate on the type of training you received at the Department of Education?
5. What other areas in HIV/AIDS education do you feel you are lacking in and require assistance?
6. Describe the curriculum that you follow to train on HIV/AIDS?
7. Is the curriculum adequate or do you have to do your own research to make the topics interesting?
8. Describe the amount of the total LO time that is allocated to HIV/AIDS education?
9. Do you feel this time is adequate to elicit any positive response in behaviour change or is it an academic exercise?
10. Describe whether you have adequate equipment like VCR's, TV and radio, to make lessons more interesting?
11. Describe the teaching methods that you find effective in teaching HIV/AIDS education?
12. Describe the number of learners that you have to teach LO to and explain whether these numbers are comfortable to work with?
13. What if any, are the problems in implementing the current LO programme, specifically in the area of HIV/AIDS?
14. What do you think will improve the HIV/AIDS part of the LO curriculum?
15. Do learners have access to individual counselling and if so how effective is this?
16. Do you have any further comments that may enlighten us on the HIV/AIDS curriculum and its effectiveness?
17. Other Comments...

Appendix 10. Be A Responsible Teenager (B.A.R.T.) Questionnaire

Date: ____ / ____ /2004	Individual Code: Grade 10.....
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Instructions:

This survey is about health behaviour. It has been developed so you can tell us what you do that may affect your health, especially sexual health. The information you give will be used to develop better health education for young people like yourself. **DO NOT** write your name on this survey. The answers you give will be kept private. No one will know what you write. Answer the questions based on what you really do. We are interested in your responses. Completing the survey is *voluntary*. **It is not a test. There are no right and wrong answers.** The questions that ask about your background will be used only to describe the types of learners completing this survey. The information will not be used to find out your name. No names will ever be reported. **All information is confidential.**

Thank you very much for your help.

**N.B. Please take careful note of the meaning of these words before you start the questionnaire.*

Key words

Sexual Intercourse =Vaginal sex: penis in vagina,

Anal sex: penis in anus/butt

Oral sex: penis in mouth, tongue in vagina, tongue in anus

(If you are doing any this, then you are sexually active)

Partner = girlfriend/boyfriend

Forced to have sex = threatened by physical violence or verbally

Abstinence or Delaying Sex= Saying 'no' to sex until you feel you are ready

Body Fluids= examples of these are saliva, blood, etc.

Going steady= you are in a long-term relationship

Negotiate=to discuss and reach an agreement on

Persuasion: to be verbally forced to agree

Other, specify= if you do not agree with the responses on the list, then you can write in your own answer

N.B. Read and answer every question. Circle one answer only per question or fill in the blanks.

SECTION 1: DEMOGRAPHIC DATA

(Adapted from learners Youth Risk Behaviour Surveillance System; CDC, 2002)

Question No.	Questions	Answers
1.	How old are you?Years
2.	What is your date of birth?	/ /
3.	What is your sex?	a. Female b. Male
4.	How would you describe yourself?	a. South African of Coloured origin b. South African of Asian/Indian origin c. South African of African/Black origin d. South African of European/White origin e. Other, specify
5.	What religious group do you belong to?	a. Moslem b. Christian c. Hindu d. African Traditional e. No Religious Group f. Other, specify
6.	Who is employed in your home?	a. Father b. Mother c. Both parents d. Guardian e. Sibling/s f. Grandparent/s g. No one

		h. Other, specify
7.	With whom do you live?	a. One Parent b. Both parents c. Grandparent/s d. Sibling/s e. Other, specify
8.	Describe the type of work that the person/persons you have listed above does.	a. Professional (nurse, teacher, doctor, etc.) b. Tradesman/women (Electrician, mechanic, etc.) c. Laborer (builder, road worker, etc.) d. Casually employed (does odd jobs when it arises, e.g. gardening) e. Unemployed (not working) f. Self-employed (runs own business) g. Other specify,

SECTION 2: HIV RISK-ASSOCIATED SEXUAL BEHAVIOUR (Adapted from Johns Hopkins Bloomberg School of Public Health, *Behaviour Surveillance system (2002)* & *Youth Risk Behaviour Surveillance (2002)*)

Question No.	Question	Answer
1.	Have you ever had sexual intercourse?	a. Yes b. No
2.	What type of sexual intercourse do you practice, if any? *N.B.: REFER TO DEFINITIONS ON PAGE 1.	a. Vaginal Sex b. Anal Sex c. Oral Sex d. All three e. None of the above f. Other, specify.....
3.	How old were you when you had sexual intercourse for the first time?	a. I have never had sexual intercourse

		b. Years c. Do not know
4.	When you first had sexual intercourse, how old was your sexual partner?	a. I have never had sexual intercourse b. Years c. Do not know
5.	Do you prefer sexual partners who are older than you?	a. Yes b. No c. Do not know
6.	Explain your choice in question 5.	
7.	Do you prefer sexual partners who are about your own age?	a. Yes b. No c. Do not know
8.	In your opinion, what is the ideal age for you to have sex for the 1 st time?	a. At any age after marriage b. Years b. Do not know
9.	In view of your answer to question 8, how many partners do you plan to have before marriage?	a. partners b. Do not know
10.	What is your relationship with the person who you last had sex with?	a. I have never had sex b. A steady boyfriend c. A steady girlfriend d. A person whom I go out with casually e. A commercial sex worker f. Other, specify.....
11.	Have you ever received money or gifts from your partner before or after sexual intercourse?	a. I have never had sex b. Yes c. No d. Do not know

12.	(Girls) Has anyone forced you to have sex?	<p>a. I have never had sex</p> <p>b. Yes</p> <p>c. No</p> <p>d. Do not know</p>
13.	(Boys) Have you ever forced a girl to have sex with you?	<p>a. I have never had sex</p> <p>b. Yes</p> <p>c. No</p> <p>d. Do not know</p>
14.	During the past year (12 months), how many people have you had vaginal sex with?	<p>a. I have never had vaginal sex</p> <p>b. Do not know</p> <p>c. Specify Number.....</p>
15.	During the past year, with how many people have you had anal sex with?	<p>a. I have never had anal sex</p> <p>b. Do not know</p> <p>c. Specify Number.....</p>
16.	During the past year, with how many people have you had oral sex with?	<p>a. I have never had oral sex</p> <p>b. Do not know</p> <p>c. Specify Number.....</p>
17.	During the past three months, with how many people did you have sexual intercourse?	<p>a. I have never had sexual intercourse</p> <p>b. I have had sexual intercourse but not during the past three months</p> <p>c. Do not know</p> <p>d. Specify, Number.....</p>
18.	*In the past three months, I have reduced the number of sexual partners that I am involved with.	<p>a. I have never had sexual intercourse</p> <p>b. I have had sexual intercourse but not during the past three months</p> <p>c. Yes</p> <p>d. No</p>

		e. Do not know
19.	Did you drink alcohol before you had sexual intercourse the last time?	a. I have never had sexual intercourse b. Yes c. No d. Do not know
20.	Did you use drugs before you had sexual intercourse the last time?	a. I have never had sexual intercourse contd.. b. Yes c. No d. Do not know
21.	How frequently do you drink alcohol before sexual intercourse?	a. I have never had sexual intercourse b. Seldom (<i>I do drink alcohol before sex, but not all the time</i>) c. Often (<i>I do drink alcohol before sex, almost every time</i>) d. All the time (<i>I drink alcohol before sex, every time</i>) e. Never (<i>I have sex without the use of alcohol</i>)
22.	How frequently do you use drugs before sexual intercourse?	a. I have never had sexual intercourse b. Seldom (<i>I do use drugs before sex, but not all the time</i>) c. Often (<i>I do use drugs before sex, almost every time</i>) d. All the time (<i>I use drugs before sex, every time</i>) e. Never (<i>I have sex without the use of drugs</i>)
23.	*The last time you had sexual intercourse; did you or your partner use a condom?	a. I have never had sexual intercourse b. Yes c. No

		d. Do not Know
24.	I use a condom at <u>every</u> sexual experience	a. I have never had sexual intercourse b. Yes c. No d. Do not know
25.	If you do not use a condom at <u>every</u> sexual experience, state some reasons for your choice.	
26.	Have you ever been pregnant or made someone pregnant?	a. I have never had sexual intercourse b. Yes c. No d. Do not know
27.	Have you ever had a sexually transmitted disease, like gonorrhea, genital warts, syphilis, etc. in the <u>last year</u> ?	a. I have never had sexual intercourse b. Yes c. No d. Do not Know
28.	Have you ever had a sexually transmitted disease, like gonorrhea, genital warts, syphilis, etc. at <u>anytime in your life</u> ?	a. I have never had sexual intercourse b. Yes c. No d. Do not Know
29.	In the past 12 months, have you had any of the following symptoms of a sexually transmitted disease?	a. Abnormal discharge from penis, anus or vagina, b. Burning feeling when you pass urine, c. Pain in the stomach area with fever, d. Pain during sex, e. Rashes or blisters or sores on genitals, f. None of the above g. List any other symptoms not

		described above
		h. Do not know
30.	If you do develop any of the above symptoms in the future, would you go for medical assistance to Wentworth Hospital?	a. Yes b. No c. Do not know
31.	If there is HIV testing in Wentworth Hospital, will you go there to be tested?	a. Yes b. No c. Do not know

SECTION 3: HIV/AIDS KNOWLEDGE, BEHAVIOURAL BELIEFS, ATTITUDES TO PERSONAL RISK, SUBJECTIVE NORMS, INTENTIONS

BELOW ARE SOME STATEMENTS ABOUT PREVENTION OF HIV/AIDS. Rate your responses from 1 to 4, 1 (Strongly Disagree), 2 (Disagree), 3 (Agree), 4 (Strongly Agree). An additional Do not Know option is given. For each question tick the response that you think is appropriate for you. Answer honestly. There is no right and wrong answer.

(Adapted from Johns Hopkins Bloomberg School of Public Health, Behaviour Surveillance System, 2002).

1. Only people who look sick can spread the AIDS virus	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
2. Only people who are older than me can get the AIDS virus.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
3. Condoms can reduce my risk of getting the AIDS virus.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
4. I can't get the AIDS virus, even if I have sexual intercourse just one time without a condom.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
5. I can get AIDS if I have sex with many boys/girlfriends.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree

6. I can get AIDS by touching or bugging or kissing someone, who is HIV infected.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
7. * I can reduce my chances of getting AIDS if I delay my first sexual experience.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
8. I can get AIDS by having anal sex without a condom (inserting a penis in another person's anus or butt).	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
9. Having sex with a virgin can cure AIDS.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
10. Only people who have sex with gay (homosexual) people get AIDS	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
11. The main body fluids that contain HIV are semen, blood, breast milk and vaginal secretions.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
12. I can get AIDS by having sexual intercourse with someone who has shared/injected drug needles.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
13. If I have a HIV negative test result that means that I cannot get HIV/AIDS.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
BEHAVIOURAL BELIEFS					
1. Condoms break easily so I prefer not to use them.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
2. If I choose to have sexual intercourse and I use a condom <u>sometimes</u> , I can prevent myself from getting the AIDS virus and other diseases.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree

3. If I choose to have sexual intercourse and I use a condom <u>every time</u> , I can prevent myself from getting the AIDS virus and other diseases.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
4. Using a condom will offend my partner.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
5. People who carry condoms have sex with a lot of people.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
6. Abstinence is the best way to prevent the spread of HIV/AIDS.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
7. My friends will laugh at me if I delay my first sexual experience.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
8. Most of my friends and kids about my age have had sex at least once.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
9. A girl who loves her boyfriend will allow him to have sex with her.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
10. Sex is not as good when a condom is used	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
11. The use of condoms interrupts sex	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
12. It is embarrassing to use a condom	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree

13. Using a condom shows lack of trust	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
14. I need to enjoy my learners by having many sexual partners.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
15. Having one sexual partner is not exciting and rather boring.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
ATTITUDES TOWARDS PERSONAL RISK					
1. I feel it is all right to have sex without a condom <u>sometimes</u> , as my chances of getting HIV is low.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
2. HIV cannot happen to me. I take my chances, but I know what I am doing.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
3. I am too young to get HIV.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
4. It is all right for me to have sex without a condom <u>sometimes</u> , if we know each other well.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
5. I feel that it is Ok for me to have many sexual partners, as I need the experience.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
6. I feel that it is just not 'cool' to delay my first sexual experience.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree

SUBJECTIVE NORMS					
1. My parent/guardian would approve of me using condoms.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
2. My religious group would approve of me using condoms.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
3. My friends would approve of me using condoms.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
4. My parent/guardian would approve, of me having many sexual partners.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
5. My friends would approve of me having many sexual partners.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
6. My religious group would approve of me having many sexual partners.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
7. My parent/guardian would approve of me having sexual intercourse before marriage.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
8. My friends would approve of me having sexual intercourse before marriage.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
9. My religious group would approve of me having sexual intercourse before marriage.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree

INTENTIONS					
1. I intend to use a condom <u>every-time</u> I have sex in the future.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
2. I intend to use a condom <u>every-time</u> ; I have sex, in the next three months.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
3. (If not already sexually active) *I intend to delay my first sexual experience, until <u>marriage</u> .	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
4. (If not already sexually active) *I intend to delay my first sexual experience until I am <u>mature</u> enough to commit to a long-term relationship.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
5. (If sexually active) I intend to reduce the number of boy/girl friends that I have sexual relations with in the next three months.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
6. I intend to be faithful to one sexual partner throughout my life.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
7. I intend to have 1 sexual partner in the next three months.	0 Do not Know	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree

SECTION 4: PERCEIVED SELF-EFFICACY (Adapted from Johns Hopkins Bloomberg School of Public Health, Behaviour Surveillance System, 2002)

1. If you did not want to have sex, how confident are you that you would be able to abstain from sexual intercourse?					
a. With a person you have known for a few days?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
b. With a person you have known for more than three months?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
c. With a person who offers you gifts?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
d. With a person you care about deeply?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
e. With someone who has power over you like a teacher or employer?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
f. If you have been drinking alcohol	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
How confident are you that you would be able to...					
a. Use a condom every time you had sexual intercourse?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
b. Delay your 1 st sexual experience, until you feel you are mature enough?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
C. Have a sexual relationship with only one person?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
3. How confident are you that you would be able to...					

a. Use a condom if you are taking alcohol.	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
b. Use a condom if you are taking drugs	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident

Try to imagine yourself in these stories and circle how confident you feel in these situations. Rate your responses as before on a scale of 1 to 4. 1 (no confidence); 2(little confidence); 3(moderate confidence); 4(very confident). A Don't Know option is also given. (Adapted from **WHO, 1994**).

1. You like your boyfriend/girlfriend very much and he/she wants to have sex with you, but you are not sure. How confident are you that you can <u>refuse sex</u> and still remain friends?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
2. You have heard that condoms are the only way to prevent you from becoming infected with HIV/AIDS and STI's, but your boyfriend/girlfriend is refusing to use a condom. How confident are you that you will be able to <u>negotiate</u> condom use?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
3. Your boyfriend/girlfriend is insisting that you have been seeing each other for a long time now and he/she forces you to have sex or else, end the relationship. How confident are you that you will be able to be <u>assertive</u> in this situation?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
4. You have bought condoms to protect you and your partner when you have sex. You really want to use condoms. How confident are you in being able to <u>use condoms correctly</u> ?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident
5. You are at a party and your boyfriend/girlfriend forces you into an isolated area at the party and repeatedly insists that you have sex with him/her. How confident are you to <u>say no to this persuasion</u> ?	0 Do not Know	1 Not at all Confident	2 A little confident	3 Moderately Confident	4 Very confident

SECTION 5: EVALUATION OF THE B.A.R.T.INTERVENTION

1. If you are sexually active, do you think this intervention will change your 'sexual risk behaviour' to safer sexual practices?	0 Do not Know	1 Definitely Not	2 Disagree	3 Agree	4 Strongly Agree
2. If you are not sexually active, do you think the intervention will change your future sexual behaviour in any way?	0 Do not Know	1 Definitely Not	2 Disagree	3 Agree	4 Strongly Agree
3. What area/s in this intervention had the most impact on you?	Explain:				
4. What area/s of the intervention can be improved?	List some suggestions.				
5. How does this intervention compare to others you have been to in school or elsewhere?	Explain:				
6. Rate the intervention on a scale of 1 to 4, with 1 being poor, and 4 being excellent.	0 Don't Know	1 Poor	2 Good	3 Very Good	4 Excellent

Appendix 11. Additional Results

Table 27. Employment Status of Families of Learners for Intervention and Control Schools at Baseline (n/%)

DEMOGRAPHIC CATEGORIES	SCHOOL 1 I n = 325	SCHOOL 2 I n = 241	SCHOOL 3 C n = 239	TOTAL n = 805	P VALUE
EMPLOYMENT	n = 310	n = 202	n = 236	n = 748	
Father	84 (27.1)	46 (22.8)	50 (21.2)	180 (24.1)	0.003 *
Mother	71 (22.9)	58 (28.7)	75 (31.8)	204 (27.3)	
Both parents	114 (36.8)	46 (22.8)	64 (27.1)	224 (29.9)	
Guardian	11 (3.5)	17 (8.4)	20 (8.5)	48 (6.4)	
Siblings	9 (2.9)	9 (4.5)	9 (3.8)	27 (3.6)	
Grandparents	3 (1.0)	2 (1.0)	3 (1.3)	8 (1.1)	
No one	18 (5.8)	24 (11.9)	15 (6.4)	57 (7.6)	
WORK TYPE of breadwinner	n = 286	n = 186	n = 217	n = 689	
Professional/Managerial	93 (32.5)	58 (31.2)	101 (46.5)	252 (36.6)	<0.001 **
Clerical	8 (2.8)	2 (1.1)	3 (1.4)	13 (1.9)	
Artisan	83 (29.0)	41 (22.0)	36 (16.6)	160 (23.2)	
Laborer	44 (15.4)	27 (14.5)	34 (15.7)	105 (15.2)	
Casual & Self-employed	38 (13.3)	23 (12.4)	26 (12.0)	87 (12.6)	
Unemployed	20 (7)	35 (18.8)	17 (7.8)	72 (10.4)	
EMPLOYED/ UNEMPLOYED	n = 286 266 (93) 20 (7)	n = 186 151 (81.2) 35 (18.8)	n = 217 200 (92.2) 17 (7.8)	n = 689 617 (89.6) 72 (10.4)	<0.001

I-intervention group; C-control group, For categorical variables: Chi square

**14.3% of cells have expected counts <5; ** 18.5% of cells have expected counts <5*

Statistically significant differences were found between schools for employment ($\chi^2=39.04$, $P = 0.003$), work type ($\chi^2 = 36.74$, $P < 0.001$) and employed-unemployed ($\chi^2= 19.25$, $P < 0.001$) categories. In school 1 slightly more than a third of both parents worked compared to less than a quarter in school 2 and more than a quarter in schools 3. School 3 had the highest percentage of mothers working and school 1 had the highest percentage of fathers working. Overall employment was high across all schools, with fewer learners who reported that no-one worked. School 2 had the highest unemployment among parents. Most parent/s were in professional and managerial jobs (36.6%), followed by artisans (23.2%) and laborers (15.2%). A small percentage were self-employed/casually employed (10.4%).

Table 28. GLM for Ever Had Sex Showing Time, Group and Time by Group Effects

Ever Had Sex	Risk Ratio	Std Error	P	95%CI
MODEL 1				
1 intervention vs control	0.97	0.11	0.84	0.77-1.23
2 interventions vs control	0.90	0.14	0.50	0.66-1.22
T2 vs T1	1.06	0.04	0.08	0.99-1.13
T3 vs T1	1.05	0.07	0.40	0.92-1.20
T4 vs T1	1.03	0.08	0.70	0.87-1.22
Time x Group	1.00	0.02	0.98	0.95-1.04

GLM analysis in Stata

The model shows the GLM for the behaviour 'ever had sex' using 1 intervention vs control and 2 interventions vs controls. Similarly no differences were found for the other risk behaviours measured.

Table 29. Risky Sexual Behaviour

Cross sectional Analysis of Age of First Sex and Forced sex for all Schools at Baseline (n/%)

Age of Sexual Initiation (years)	Forced Sex N = 14	P value
9-12	1 (7.1)	0.34
13-15	10 (71.4)	
16-20	1 (7.1)	
Do not Know	2 (14.3)	

Pearson's chi square

Table 30. Cross Sectional Analysis of the Type of Sex Practiced by Learners Showing Differences between Intervention and Control Groups at T1-T4 (n/%)

Type of Sexual Intercourse	Intervention School	Control School	Total	P value
T1	n = 172	n = 79	n = 251	
Vaginal	121 (70.0)	54 (68.4)	175 (69.7)	0.03
Oral	1 (5.8)	1 (1.3)	2 (0.8)	
Anal	8 (4.6)	10 (12.7)	18 (7.2)	
Any Combination	42 (24.4)	14 (18.6)	56 (22.3)	
T2	n = 162	n = 73	n = 235	
Vaginal	119 (73.4)	53 (72.6)	172 (73.2)	0.60
Oral	1 (0.6)	1 (1.4)	2 (0.9)	
Anal	7 (4.3)	4 (5.5)	11 (4.7)	
Any Combination	35 (21.6)	15 (20.5)	50 (21.3)	
T3	n = 108	n = 39	n = 147	
Vaginal	80 (74.0)	27 (69.2)	107 (72.8)	0.72
Oral	4 (3.7)	1 (2.6)	5 (3.4)	
Anal	7 (6.4)	1 (2.6)	8 (5.4)	
Any Combination	17 (15.7)	10 (25.6)	27 (18.4)	
Time4	n = 162	n = 73	n = 235	
Vaginal	119 (73.4)	53 (72.6)	172 (73.2)	0.60
Oral	1 (0.6)	1 (1.4)	2 (0.9)	
Anal	7 (4.3)	4 (5.5)	11 (4.7)	
Any Combination	35 (21.6)	15 (20.5)	50 (21.3)	

Pearson's chi square

Table 31. Cross sectional Analysis of Alcohol Use at Last Sex showing Differences between Intervention and Control Groups at T1-T4 (n/%)

Alcohol Use at Last Sex	Intervention Schools	Control Schools	Total	P value
T2	n = 134 35 (26.1)	n = 65 15 (23.1)	n = 199 50 (25.1)	0.64
T3	n = 57 6 (10.5)	n = 90 24 (26.7)	n = 147 30 (20.4)	0.02
T4	n = 70 16 (22.9)	n = 34 9 (26.5)	n = 104 25 (24.0)	0.68

Pearson's chi square

Table 32. Cross sectional Analysis of Forced Sex between T2-T4 showing Differences between Intervention and Control Schools (n/%)

Forced to have Sex	Intervention Schools	Control Schools	Total	P value
T2	n = 144 17 (11.8)	n = 69 9 (13.0)	n = 213 26 (12.2)	0.79
T3	n = 50 1 (2.0)	n = 116 12 (10.3)	n = 166 13 (7.8)	0.03
T4	n = 84 8 (9.5)	n = 52 0 (0.0)	n = 136 8 (5.9)	0.01

Pearson's chi square

Table 33. Cross sectional Analysis of Preference for Older Partners showing Differences between Intervention and Control Groups at T2-T4 (n/%)

Preferred older partners	Intervention Schools	Control Schools	Total	P value
T2	n = 177 88 (49.7)	n = 82 30 (36.6)	n = 259 118 (45.6)	0.13
T3	n = 67 23 (34.3)	n = 128 71 (55.5)	n = 195 94 (48.2)	0.03
T4	n = 70 38 (54.3)	n = 34 19 (55.9)	n = 104 57 (54.8)	0.16

Pearson's chi square

Table 34. Cross Sectional Analysis of Relationship to Person at Last Sex showing Differences between Intervention and Control Groups at T1-T4 (n/%)

Relationship to Person at Last Sex	Intervention Schools	Control Schools	Total	P value
T1 Steady Casual Commercial sex worker	n = 147 87 (59.2) 51 (34.7) 9 (6.1)	n = 66 44 (66.7) 21 (31.8) 1 (1.5)	n = 213 131 (61.5) 72 (33.8) 10 (4.7)	0.27
T2 Steady Casual Commercial sex worker	n = 138 83 (60.1) 50 (36.2) 5 (3.6)	n = 60 34 (56.7) 25 (41.7) 1 (1.7)	n = 198 117 (59.1) 75 (37.9) 6 (3.0)	0.63
T3 Steady Casual Commercial sex worker	n = 46 27 (58.7) 19 (41.3) 0 (0)	n = 89 52 (58.4) 31 (34.8) 6 (6.7)	n = 135 79 (58.5) 50 (37.0) 6 (4.4)	0.18
T4 Steady Casual Commercial sex worker	n = 74 52 (70.3) 18 (24.3) 4 (5.4)	n = 39 26 (66.7) 9 (23.1) 4 (10.3)	n = 113 78 (69.0) 27 (23.9) 8 (7.1)	0.63

Pearson's chi square

Table 35. Cross Sectional Analysis of Received Money or Gifts for Sex Showing Differences between Intervention and Control Groups at T1-T4 (n/%)

Received Money or Gifts for Sex	Intervention Schools	Control Schools	Total	P value
T1	n = 164 66 (40.2)	n = 69 36 (52.2)	n = 233 102 (43.8)	0.09
T2	n = 172 47 (27.3)	n = 76 20 (26.3)	n = 248 67 (27.0)	0.32
T3	n = 63 9 (14.3)	n = 127 36 (28.3)	n = 190 45 (23.7)	0.07
T4	n = 90 23 (25.6)	n = 38 16 (42.1)	n = 128 39 (30.5)	0.02

Pearson's chi square

Protective Behaviours

Table 36. Cross sectional Analysis of Condom Use at Last Sex showing Differences between Intervention and Control Groups at T2-T4 (n/%)

Condom Use At Last Sex	Intervention Schools	Control Schools	Total	P value
T2	n = 131 96 (73.3)	n = 61 39 (63.9)	n = 192 135 (70.3)	0.18
T3	n = 45 37 (82.2)	n = 87 58 (66.7)	n = 132 95 (72.0)	0.06
T4	n = 72 43 (59.7)	n = 38 22 (57.9)	n = 110 65 (59.1)	0.85

Pearson's chi square

Table 37. Showing Cross sectional Analysis of Condom Use at Every Sex showing Differences between Intervention and Control Groups at T2-T4 (n/%)

Condom Use at Every Sex	Intervention Schools	Control Schools	Total	P value
T2	n = 131 91 (69.5)	n = 62 35 (56.5)	n = 193 126 (65.3)	0.07
T3	n = 44 32 (72.7)	n = 81 51 (63.0)	n = 125 83 (66.4)	0.27
T4	n = 69 39 (56.5)	n = 36 20 (55.6)	n = 105 59 (56.2)	0.93

Pearson's chi square

Table 38. Cross Sectional Analysis of Reduced Partners in the Past Three Months showing Differences between Intervention and Control Schools at T2-T4 (n/%)

Reduced Partners in the Past three months	Intervention Schools	Control Schools	Total	P value
T2	n = 91 45 (49.5)	n = 42 20 (47.6)	n = 133 65 (48.9)	0.84
T3	n = 30 11 (36.7)	n = 56 25 (44.6)	n = 86 36 (41.9)	0.47
T4	n = 54 25 (46.3)	n = 23 8 (34.8)	n = 77 33 (42.9)	0.35

Pearson's chi square

The Consequences of Risky Sexual Behaviours

Table 39. Cross Sectional Analysis of Pregnancy among Learners Showing Differences between Intervention and Control Groups at T2-T4 (n/%)

Been Pregnant/made someone Pregnant	Intervention Schools	Control Schools	Total	P value
T2	n = 172 20 (11.6)	n = 77 10 (13.0)	n = 249 30 (12.0)	0.12
T3	n = 65 6 (9.2)	n = 131 13 (9.9)	n = 196 19 (9.7)	0.26
T4	n = 82 10 (12.2)	n = 38 7 (18.4)	n = 120 17 (14.2)	0.22

Pearson's chi square

Table 40. Cross Sectional Analysis of STIs in the Last Year Showing Differences between Intervention and Control Groups at T1-T4 (n/%)

STIs in the Last year	Intervention Schools	Control Schools	Total	P value
T2	n = 173 5 (2.9)	n = 78 10 (12.8)	n = 251 15 (6.0)	0.004
T3	n = 65 0 (0)	n = 132 8 (6.1)	n = 197 8 (4.1)	0.05
T4	n = 94 4 (4.3)	n = 43 1 (2.3)	n = 137 5 (3.6)	0.28

Pearson's chi square

Index of AIDS Risk Sexual Behaviours by Group

The baseline results highlighted the prevalence of behaviours that place learners at risk of HIV/AIDS. A summary of intervention and control group percentages of learner's sexual practices are presented as a AIDS Risk Index.

Table 41. Aids Risk Behaviour showing Differences between Intervention and Control Groups at Baseline (%)

At Risk Behaviours	I %	C %
Inconsistent condom use	30.7	53.7
Early sexual initiation (< 15 yrs)	52.6	38.0
Coercive or forced sex	5.2	11.3
Alcohol use before sex	34.6	15.1
Casual sex	34.7	31.8
Involvement with commercial sex workers	6.1	1.5
Preference for older partners	73.4	46.4
Receiving money or gifts for sex	40.2	52.2
Multiple Partners (4-6)	11.2	10.6

I-intervention group; C-control group

Both the intervention and control groups reported early sexual initiation amongst the majority of sexually experienced learners, preference for older partners and a third engaged in casual sex. Inconsistent condom use was prevalent more so amongst the control group and more alcohol use before sex was reported by the intervention group. Multiple partners, forced sex and involvement with sexworkers were reported by fewer learners in both groups.

Graphs Showing Cross Sectional Analysis of Sexual Behaviours Over Time (T1-T4)

The following graphs illustrate cross sectionally the behaviours and determinant scores of learners. They do not reflect the interaction between time and group and therefore do not indicate the overall impact of the study findings. The cross sectional graphical representation illustrates trends for behaviour and determinants of sexual behaviour. These illustrations therefore cannot be compared with the impact analysis of this study.

A. Risky Behaviours

a. Ever Had Sex

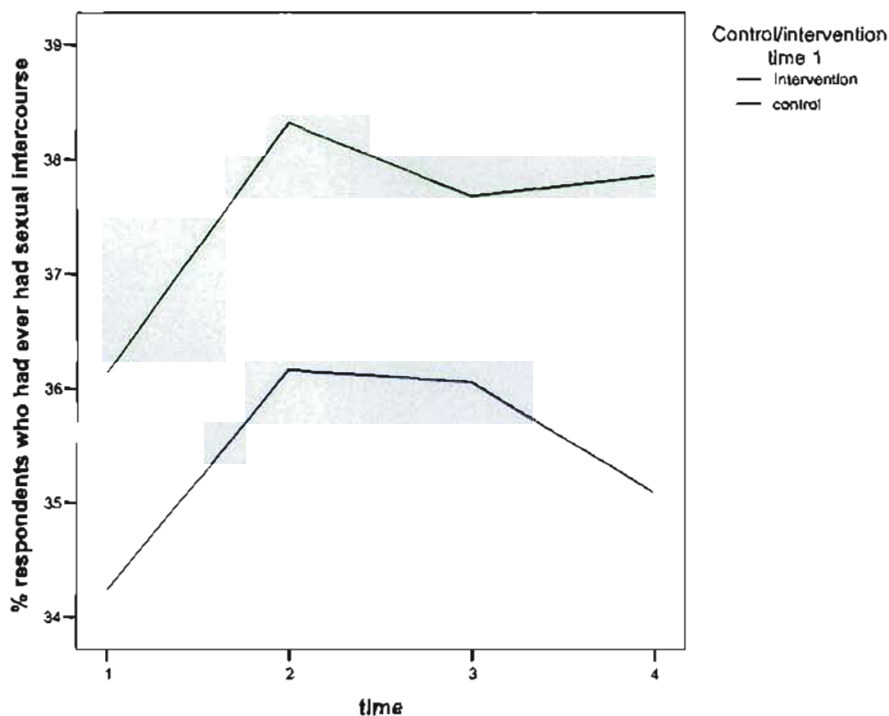


Figure 8. Prevalence of learners who ever had sexual intercourse from T1-T4 for intervention and control groups (% positive response)

Figure 8 shows almost parallel profiles of the two groups until T3, where after the intervention group shows a slight decrease in the initiation of sexual activity and the control group shows a slight increase in initiation of sexual activity. The slight decrease in initiation of sexual activity may therefore indicate high abstinence after T3 for intervention group learners.

b. Alcohol Use at Last Sex

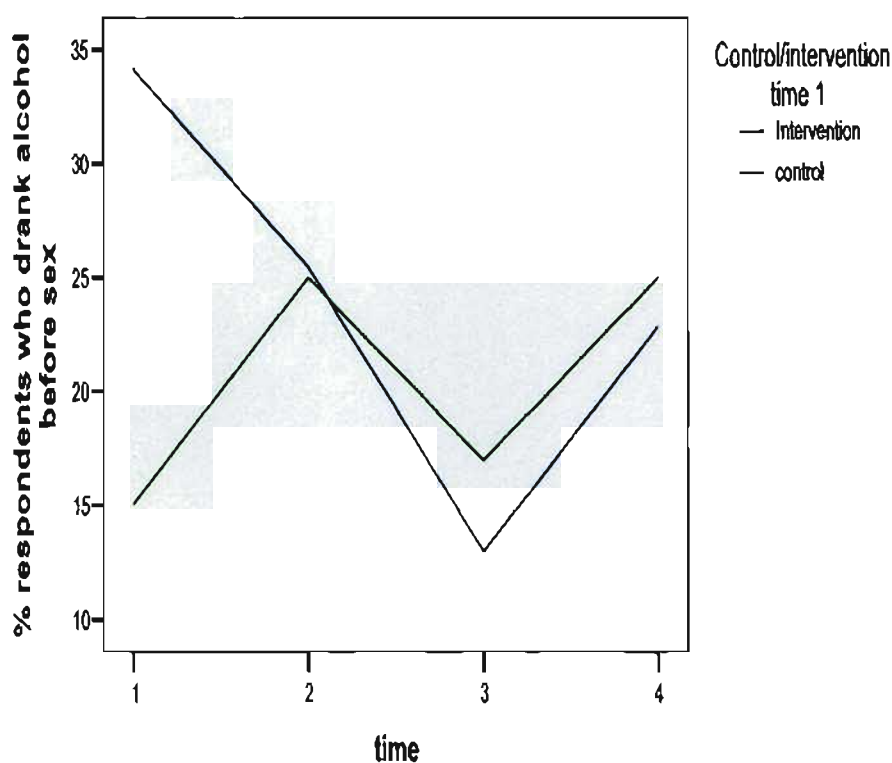


Figure 9. Prevalence of learners who used alcohol at last sex from T1-T4 for intervention and control groups (% positive responses)

Figure 9 shows a general decrease in alcohol use at last sex in the intervention group and a corresponding slight increase over time in the control group.

B. Protective Behaviours

a. Condom Use at Last Sex

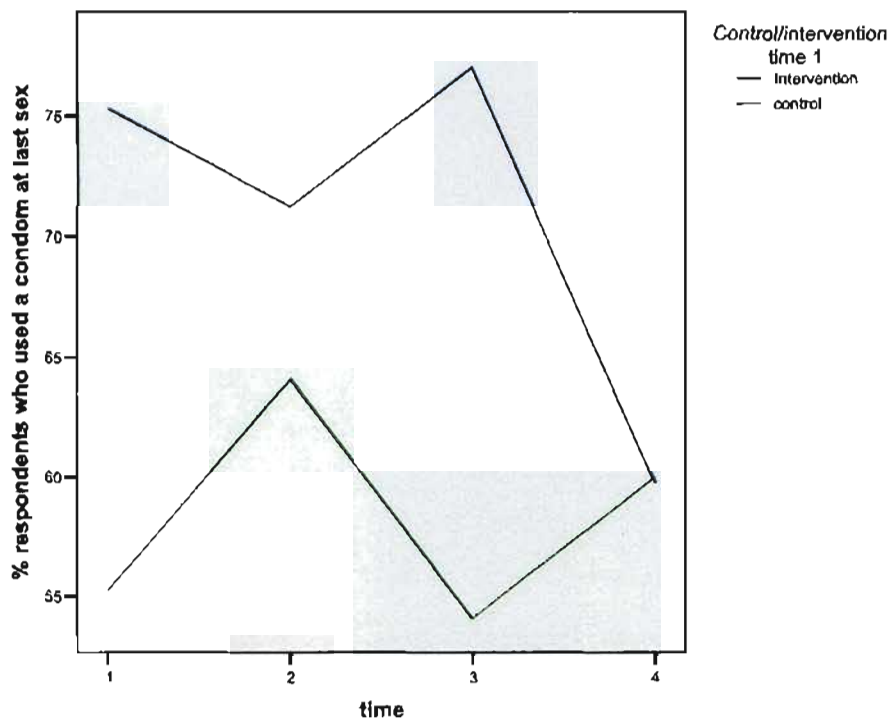


Figure 10. Prevalence of learners who used condoms at last sex from T1-T4 for intervention and control groups (% positive responses)

Figure 10 shows a trend of a decrease in condom use at last sex in the intervention group after T3 relative to the control group and an increased trend in the control group relative to the intervention group in terms of condom use. The profiles might have crossed over if the time was extended, but did not until time 4.

b. Condom Use at Every Sex

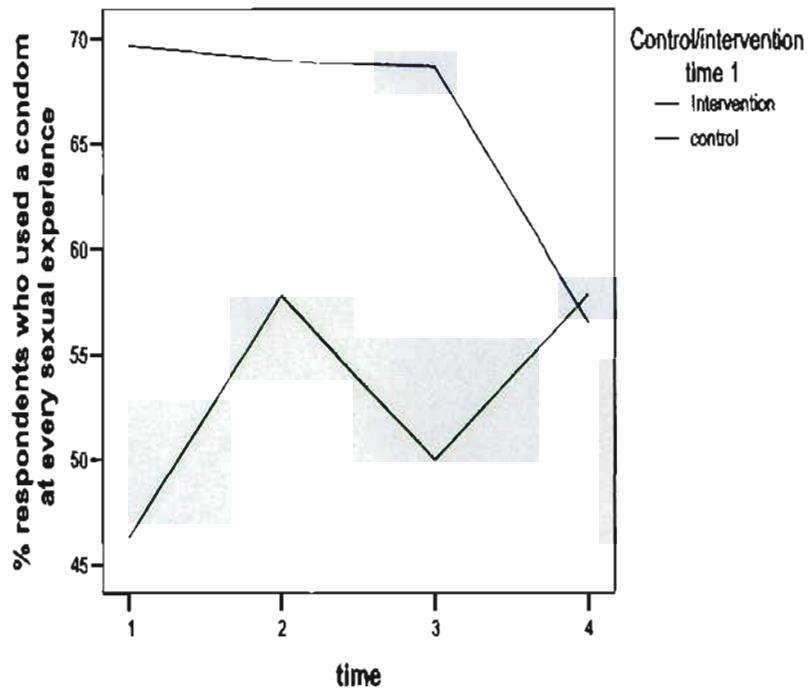


Figure 11. Prevalence of learners who reported condom use at every sex from T1-T4 for intervention and control groups (% positive responses)

Figure 11 shows that the intervention group started to decrease their condom use at every sex after T3 while the control group showed an overall increase in condom use at every sex, from T1 to T4. The profiles of the two groups began to cross over at T4.

c. Reduction of Partners in the Past three months

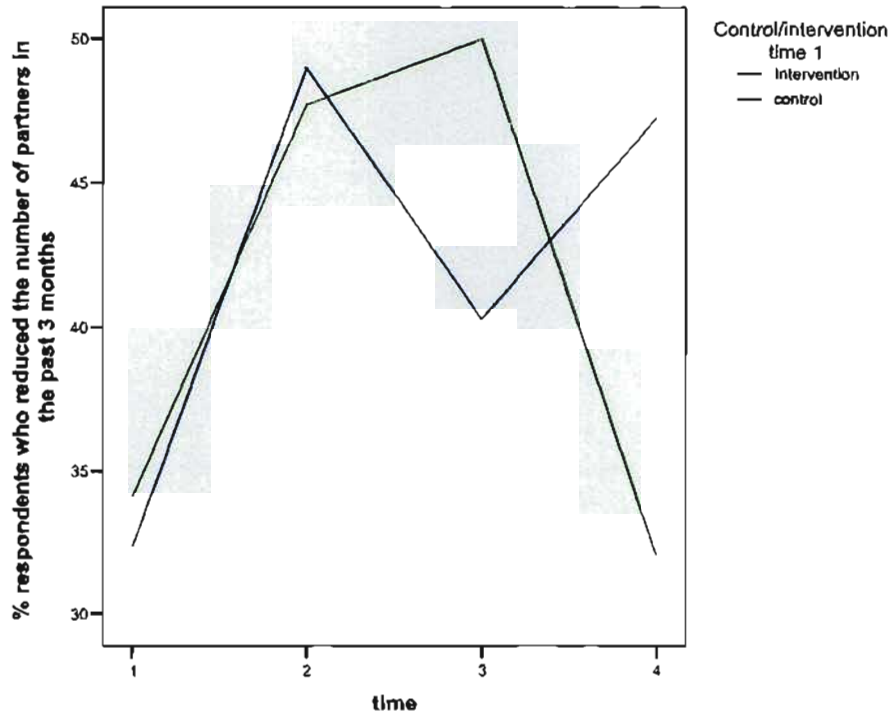


Figure 12. Prevalence of learners who reduced partners in the past three months for intervention and control groups (% positive response)

Figure 12 shows a trend of a decrease among control group learners who reduced partners in the past three months, after T3; whilst an overall increase in learners who reported a reduction of partners is shown in the intervention group from T1 to T4.

Graphs Showing Cross Sectional Analysis of Determinant Changes Over Time (T1-T4)

a. Change in Knowledge Over Time

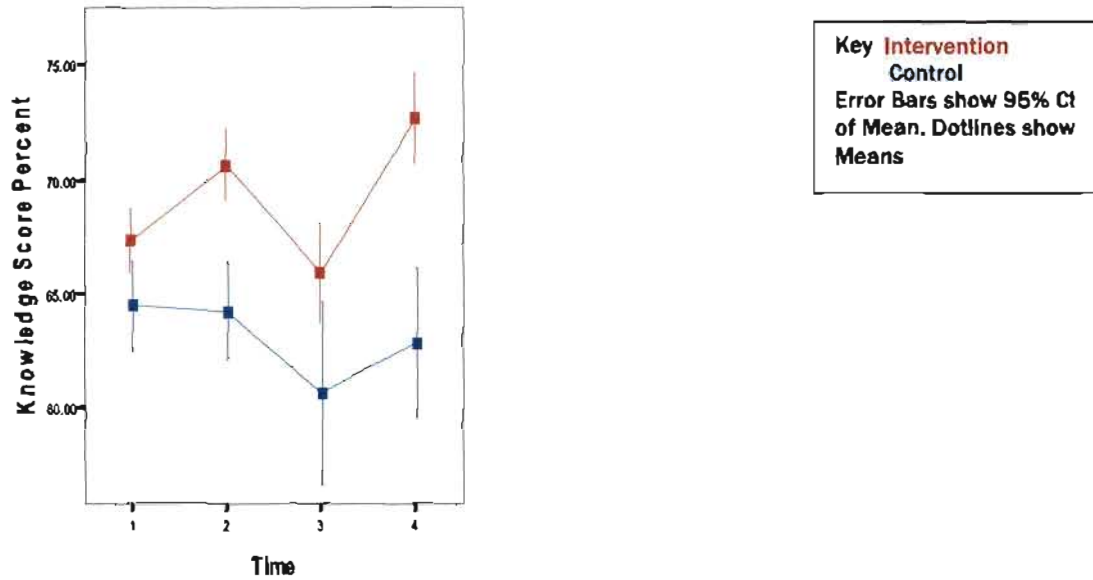


Figure 13. Learner's knowledge score percent over time from T1-T4 for intervention and control groups

In Figure 13 the general trend shown by the plot is an increase in knowledge score over time in the intervention group and a corresponding slight decrease in knowledge percentage for the control group.

b. Change in Belief Over Time

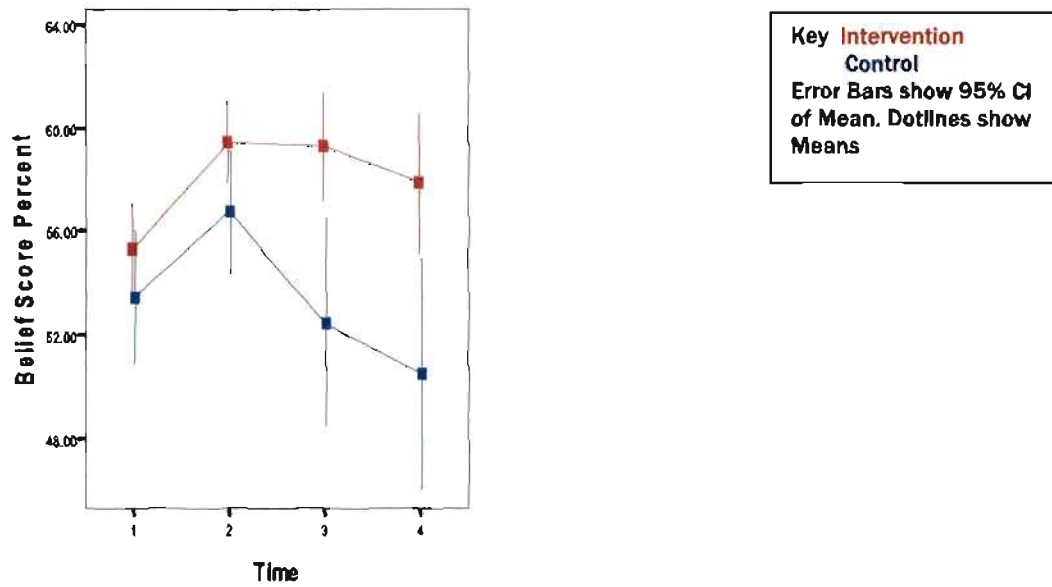


Figure 14. Learner's belief score percent over time for intervention and control groups

In Figure 14, the general trend shown by the plot is an increase in belief score percent in the intervention group and a corresponding decrease in belief percent in the control group.

c. Change in Attitude Over Time

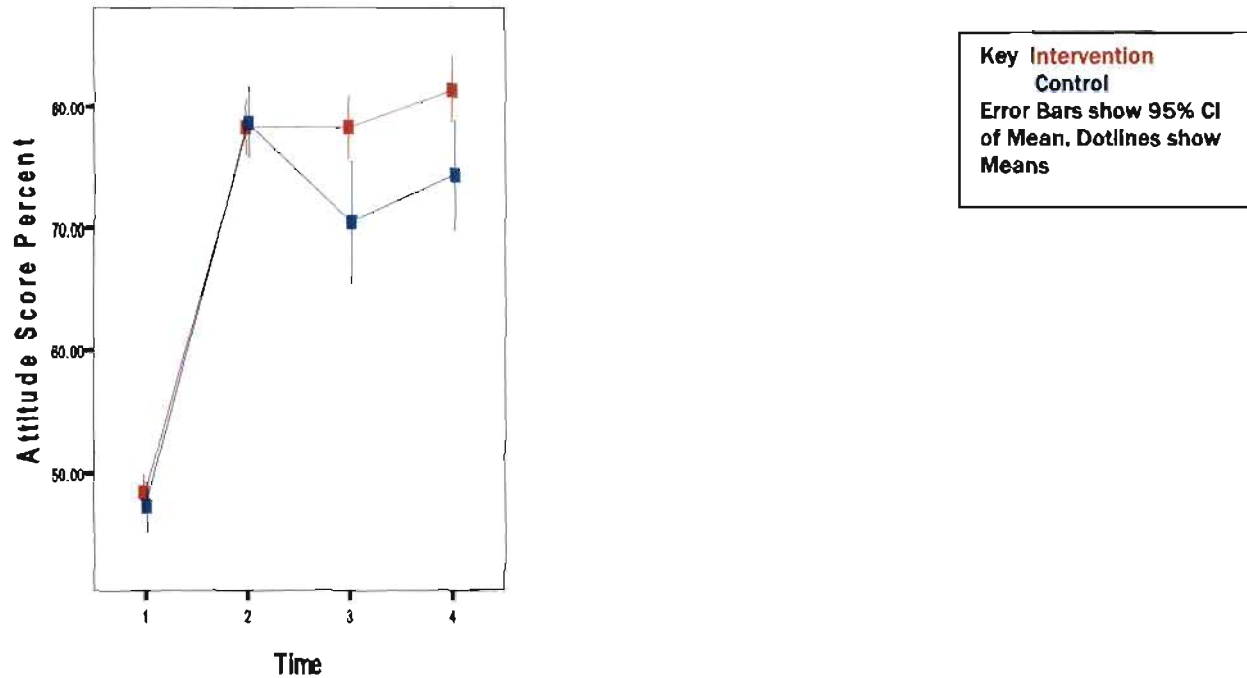


Figure 15. Learner's attitude score percent over time from T1-T4 for intervention and control groups

Figure 15 shows that learners had increasingly more positive attitudes from T1 to T2 in the intervention and control groups and from T2 to T4 there was a trend showing an increase in attitude percent in the intervention group relative to the control group.

d. Change in Subjective Norms Over Time

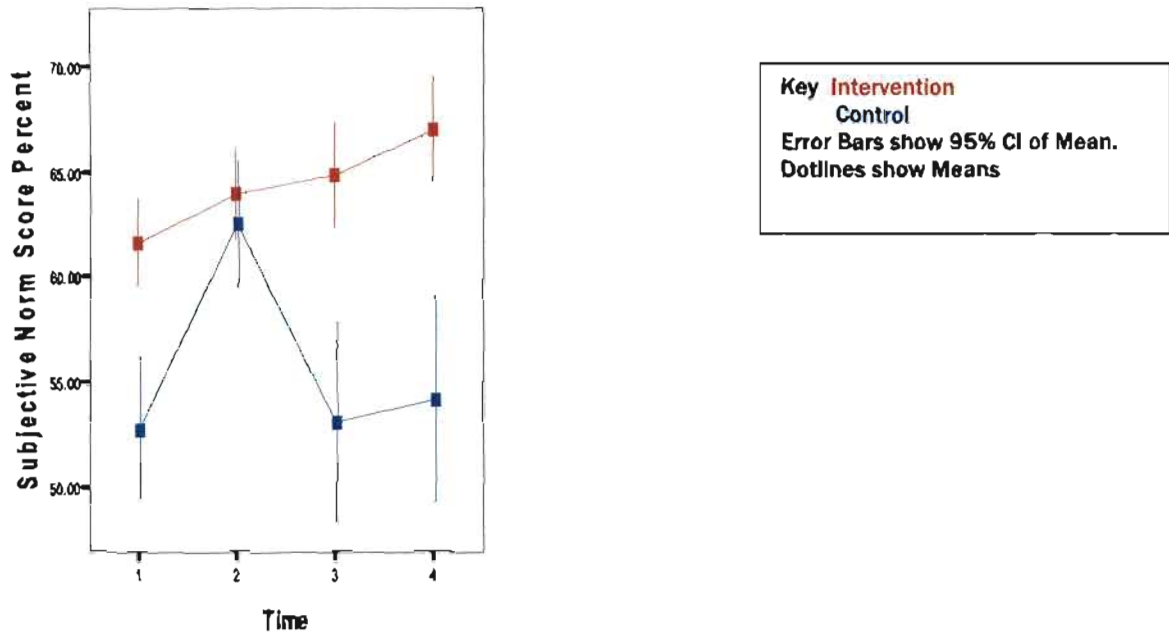


Figure 16. Learner's subjective norm score percent over time from T1-T4 for intervention and control groups

In Figure 16 there was a trend of a slight increase in subjective norm scores for both intervention and control group in an almost parallel direction except for T2 where profiles cross.

e. Change in Self-Efficacy Over Time

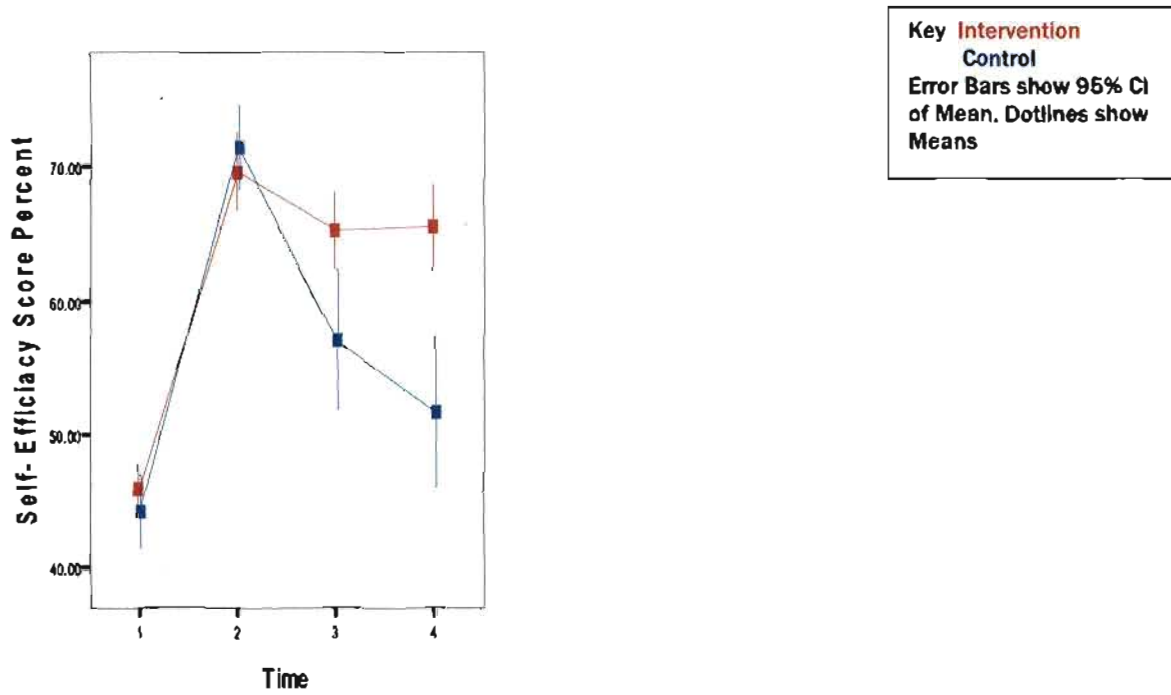


Figure 17. Learner's self-efficacy score percent over time from T1-T4 for intervention and control groups

In Figure 17 there was a trend for the intervention group and control group self-efficacy score percent to increase steadily where after T2 to T4 a decrease in score percent is noted for both groups.

f. Change in Intentions Over Time

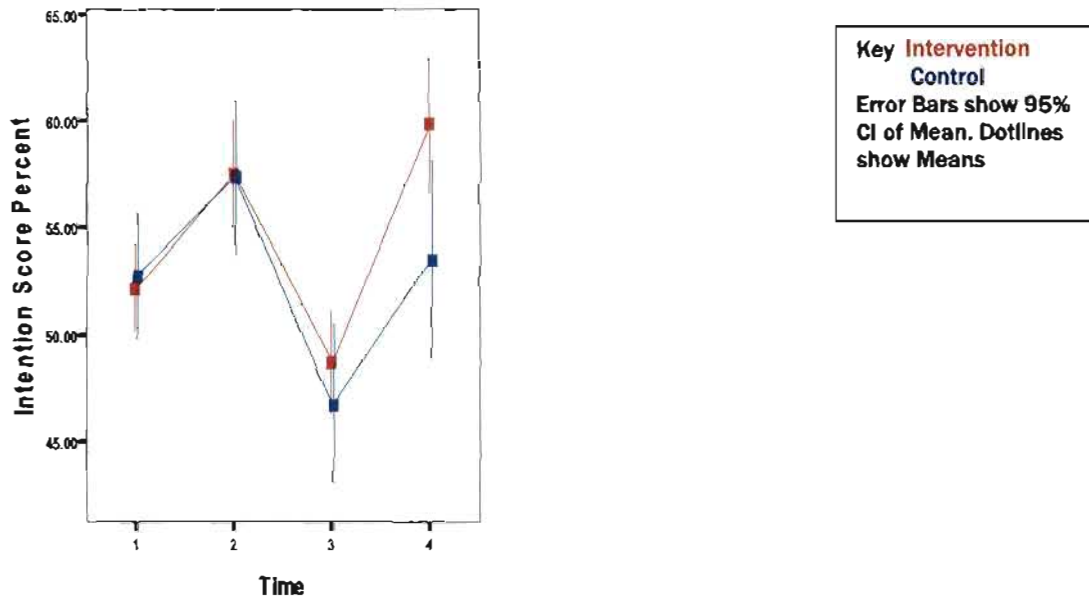


Figure 18. Learner's intention score percent over time from T1-T4 for intervention and control groups

Figure 18 shows that there were erratic changes in intention score percent and a trend of an increase in intention scores from T1-T4 in the intervention group and an almost leveling off in the control group.

The graphs show that when the lines in the intervention and control groups were parallel to each other the both group achieved similar results, although at each time point statistically significant differences may have been found. If the profiles crossed over or were not parallel then the intervention and control groups had different effects over time. This graphical representation of behaviours and determinants shows the percentage positive responses cross sectionally only.

Gender Differences for Sexual Behaviours at Baseline

Table 42. Cross Sectional Analysis between Sexual Behaviour and Gender for Learners at Baseline (n/%)

Sexual behaviour	Females n = 96	Males n = 169	P value
Ever had sex	95 (21.7)	168 (53.2)	0.001
Forced to have sex <i>n = 18</i>	14 (15.1)	4 (2.5)	0.001
Age of first sex (yrs) <i>n = 225</i>			0.001
9-12	7 (8.8)	36 (24.8)	
13-15	42 (52.5)	66 (45.5)	
16-20	24 (30.0)	13 (9.0)	
do not know	7 (8.8)	30 (20.7)	
Alcohol use at last sex <i>n = 63</i>	16 (19.0)	47 (33.3)	0.02
Prefer older partners <i>n = 145</i>	44 (57.9)	101(68.7)	0.11
Received gifts/money for sex <i>n = 102</i>	38 (44.2)	64 (43.5)	0.92
Condom use:			
At every sex <i>n = 137</i>	47 (60.3)	90 (63.4)	0.65
At last sex <i>n = 153</i>	56 (66.7)	97 (70.8)	0.52
Relationship to Partner <i>n = 212</i>			0.002
Steady	57 (75.0)	73 (53.7)	
Casual	14 (18.4)	58 (42.6)	
Commercial Sex Worker	5 (6.6)	5 (3.7)	

Pearson's chi square

Impact Evaluation of Condom Use at Every Sex

Table 43. Learners' Condom Use at Every Sex Responses, Showing Risk Ratios (95% CI) for Time, Group and Time by Group Interaction (n = 343)

Condom Use at Every Sex	Risk Ratio	SE	P	95%CI
Time Effects				
T2 vs. T1	1.14	0.09	0.11	0.97, 1.35
T3 vs. T1	1.21	0.17	0.15	0.92, 1.59
T4 vs. T1	1.18	0.22	0.35	0.82, 1.71
Group Effects				
I vs. C	1.66	0.30	0.01	1.12, 2.33
Time by Group Interaction	0.90	0.06	0.14	0.78, 1.02
Sex				
Males vs Females	1.16	0.09	0.06	0.99, 1.35
Missing vs Females	1.02	0.19	0.90	0.70, 1.48

T1-time 1, T2-time 2, T3-time 3, T4-time 4, I-intervention; C-control, SE- standard error, GLM in Stata

Similar results were found for consistent condom use. There were no time effects for consistent condom use but statistically significant group effects were found ($P = 0.01$). The intervention group was 1.66 times more likely to use condoms at every sex, than the control group, irrespective of time, which may be due to baseline differences. No significant differences were found for males and females. The B.A.R.T. intervention did not produce an intervention effect for this outcome.

Evaluation of the B.A.R.T. Intervention among Sexually Active and Inactive Learners

The B.A.R.T. intervention was evaluated at T2 and T3 only, as these were the time points when the intervention was done. The analysis included only the intervention group as only this group was exposed to the intervention.

Table 44. Evaluation of Sexually Active and Sexually Inactive Learners Responses to the B.A.R.T. Intervention showing whether the Intervention Changed Sexual Behaviour

Sexually Active Learners		T3					
		Do not Know	Definitely Not	Disagree	Agree	Strongly Agree	TOTAL
T2	Do not Know	137	7	3	16	18	181
	Definitely Not	10	1	0	3	3	17
	Disagree	4	1	2	1	3	11
	Agree	10	0	0	4	4	18
	Strongly Agree	28	2	1	5	12	48
	TOTAL	189	11	6	29	40	275
Sexually In Active Learners							
T2	Do not Know	81	10	8	16	19	134
	Definitely Not	10	3	1	5	4	23
	Disagree	4	0	2	3	3	12
	Agree	11	0	2	17	10	40
	Strongly Agree	32	2	0	4	29	67
	TOTAL	138	15	13	45	65	276

McNemar-Bowker for paired samples

Sexually Active Group: The table shows that on the McNemar test, no significance difference was found from T2 to T3 among sexually active learners, with regard to whether the intervention would change risky sexual behaviour to safer sex practices ($P = 0.85$). However, when examining the proportions, a quarter of learners tended towards safer sex whereas half were unsure, suggesting in terms of the transtheoretical model, that behaviour change does occur in stages (*see discussion*). A large number of learners responded with 'do not know' responses indicating that they could have changed anywhere along any stage of behaviour and this is therefore, not necessarily a negative outcome. The numbers above the diagonal (in purple) showed that thirteen learners indicated that the intervention would change their risky behaviour to safer sex behaviour while nine (in blue) said that the intervention would decrease their safer sex options. This suggests that from T2 to T3 there was a higher proportion of learners who reported in favour of the B.A.R.T. intervention. Excluding 'do not know'

responses, the majority of sexually active learners (twelve) 'strongly agreed', that they would change their sexual behaviour in a positive direction. Further, two by two analysis of only the 'definitely not' and 'strongly agree' responses of the sexually active learners, reported a 14.3% change in behaviour in T2 which increased to 85.7% in T3. This was however not statistically significant ($P = 1.00$) and the number of cases was small ($n = \text{eighteen}$) (*not in table*).

Sexually Inactive Group: the intervention did not have a significant impact on sexually inactive learners. There were no significant differences with regard to the intervention resulting in behaviour change in T2 to T3 ($P = 0.28$). Less than half of the learners 'agreed' that they would change their behaviour while almost half were not sure of their responses. The number of learners that indicated that they would improve their behaviour was twenty-six as opposed to eight, who indicated a change in a negative direction. Therefore this suggests that the intervention may have had a slight and non significant positive influence on sexually inactive learners from T2 to T3. The 'do not know' responses can be explained in terms of Transtheoretical Models (*see discussion*). The majority of sexually inactive learners (twenty-nine) strongly agreed that the intervention had a positive impact on their sexual behaviour practices. Further, two by two analysis of only the 'definitely not' and 'strongly agree' responses, showed that in T2, 6.5% of the sexually inactive learners said they would change their behaviour in response to the intervention and this number increased in T3 to 93.5%. This was not a statistically significant response ($P = 0.68$) as the number of cases was small ($n = 38$).

Over all the B.A.R.T. intervention had a non significant positive response on learner's responses to behaviour change in T2 and again in T3. Sexually active and inactive learners reported that they would opt for safer sex options.

Health Seeking Behaviour of Learners

In keeping with the rationale for this intervention being a link between the community and the hospital; and in terms of reasons for selection of the Wentworth community; learners from Wentworth High schools, were asked whether they would access medical services from Wentworth Hospital and whether they would go to Wentworth Hospital for VCT.

Table 45. Cross sectional Analysis showing Positive Responses Regarding Seeking Medical Assistance from Wentworth Hospital for Intervention and Control Groups at T1-T4 (n/%)

Will Seek Medical Assistance at WWH	Intervention School	Control School	P value
T1 n = 168	112 (66.7)	56 (33.3)	0.80
T2 n = 144	92 (63.9)	52 (36.1)	0.87
T3 n = 92	39 (42.4)	53 (57.6)	0.001
T4 n = 54	37 (68.5)	17 (31.5)	0.07

Pearson's chi square

Table 46. Cross sectional Analysis showing Positive Responses regarding whether Learners would go for a HIV Test to Wentworth Hospital for Intervention and Control groups at T1-T4 (n/%)

HIV Testing at WWH	Intervention School	Control School	P value
T1 n = 134	90 (67.2)	44 (32.8)	0.58
T2 n = 119	82 (68.9)	37 (31.1)	0.21
T3 n = 76	33 (43.4)	43 (56.6)	0.001
T4 n = 49	31 (63.3)	18 (36.7)	0.08

Pearson's chi square

A significant difference was found between the intervention and control schools for T3 only, with regard to seeking medical assistance at Wentworth Hospital ($P = 0.001$). At other time points more learners in the intervention school than the control school indicated that they would seek medical assistance at Wentworth Hospital but this was not statistically significant.

Similarly, a significant difference between intervention and control schools for T3 only, with regard to going for a HIV testing at Wentworth Hospital ($P = 0.001$). At other time points more learners in the intervention

group than the control group indicated that they would go for HIV testing at Wentworth Hospital, but again this was not statistically significant.

Table 47. Medians of all Determinants of Sexual Behaviour at T1 Showing differences between Intervention and Control Groups (n = 760)

Knowledge Questions	Median*		P value
	I	C	
Only people who look sick can spread the AIDS virus	2	2	0.05
Only people who are older than me can get the AIDS virus	1	1	0.15
I can get the AIDS virus by touching or hugging or kissing someone who is HIV infected	1	1	0.66
Having sex with a virgin can cure AIDS	1	1	<0.001
Only people who have sex with gay people get AIDS	1	1	0.02
If I have a HIV negative test result that means that I cannot get HTV/AIDS	2	2	0.38
Belief Questions			
Most of my friends about my age have had sex at least once	2	2	0.89
A girl who loves her boyfriend will allow him to have sex with her	2	2	0.55
People who carry condoms have sex with a lot of people	2	2	0.93
It is embarrassing to use a condom	3	3	0.19
Attitude Questions			
I feel it is all right to have sex without a condom sometimes as my chances of getting HIV is low	4	3	0.92
HIV cannot happen to me. I take my chances but I know what I am doing	4	3	0.17
Self-efficacy			
<i>How confident are you to use a condom if you have been taking drugs</i>	1	1	0.15
<i>How confident are you to abstain from sex-with a person you have known for a few days</i>	1	1	0.41

<i>How confident are you to abstain from sex-with a person you have known for more than three months</i>	2	1	0.85
<i>How confident are you to abstain from sex-with a person you care about deeply</i>	2	2	0.13
<i>How confident are you to abstain from sex-with someone who has power over you like a teacher</i>	1	1	0.40
Refuse sex and be friends with your partner who wants to have sex with you but you are not sure	2	2	0.36
Negotiate condom use with your partner who is refusing to use condoms	1	1	0.86
Be assertive with your partner who forces you to have sex with him or end the relationship	1	1	0.57
Use a condom correctly	4	4	0.72
You are persuaded or forced to have sex with your partner in an isolated area	2	2	0.42
Intentions			
I intend to use a condom every-time I have sex in the next three months	4	3	0.85
I intend to reduce the number of partners I have sexual relations with in the next three months	1	1	0.82
I intend to be faithful to one sexual partner throughout my life	3	3	0.31

*Median- 1: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree, I-intervention group; C-control group, Mann-Whitney Test

Table 48. Tests Between and Within Subject Effects for Determinant Scores for Subjects Present at All Time Points

Determinants of Sexual Behaviour	Time effect		Group Effect		Time x Group Interaction	
	Wilks' Lambda	P value	F	P value	Wilks' Lambda	P value
Knowledge n = 279	0.95	0.005	24.78	<0.001	0.99	0.66
Beliefs n = 236	0.94	<0.001	6.50	0.01	0.99	0.97
Attitudes n = 228	0.28	<0.001	12.23	<0.001	0.98	0.40
Subjective norms n = 210	0.94	0.003	20.78	<0.001	0.98	0.51
Self-Efficacy n = 197	0.59	<0.001	9.67	0.002	0.99	0.76
Intention n = 207	0.80	<0.001	0.75	0.38	0.99	0.59

Repeated measures ANOVA

Evaluation of Changes in Determinants of Sexual Behaviour for Subjects Present at all Time Points was done.

This analysis does not account for subjects that had dropped out or entered and exited at different points.

No significant interaction effects for subjects that were present at all time points was reported. A significant group effect was found for knowledge, attitudes and subjective norms ($P < 0.001$), in favour of the intervention group. A significant time effect was reported for beliefs, attitudes, self-efficacy and intentions ($P < 0.001$) in favour of the intervention group. The significant time and group effects may be due to baseline differences, as no intervention effect was found. However this was not a true reflection of the data, as it does not take into account all subjects in this analysis. The following graphs illustrate \ the marginal mean scores for subjects present at all time points.

Figure 19. Marginal Mean Scores of Determinants for Subjects Present at All Time Points

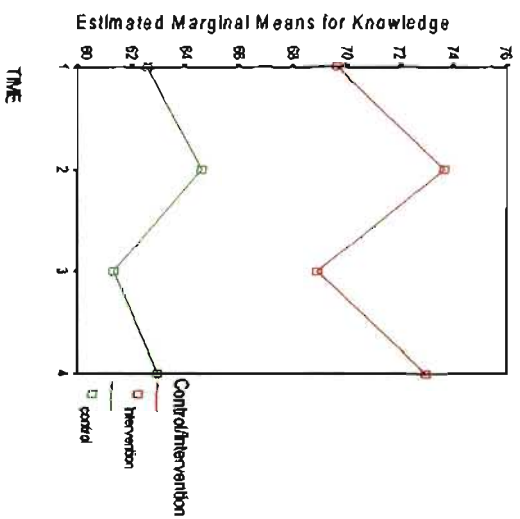


Figure 19a. Estimated Knowledge Marginal Mean

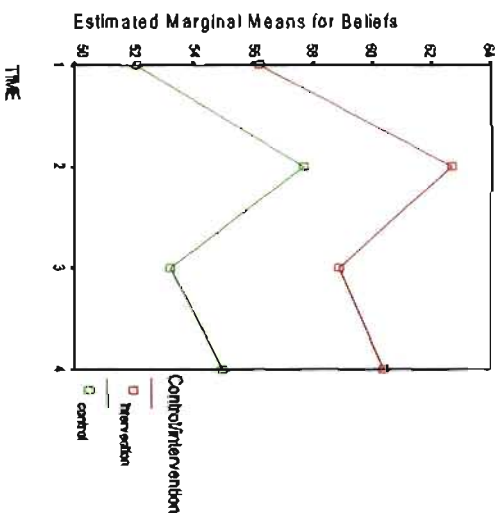


Figure 19b. Estimated Belief Marginal Mean

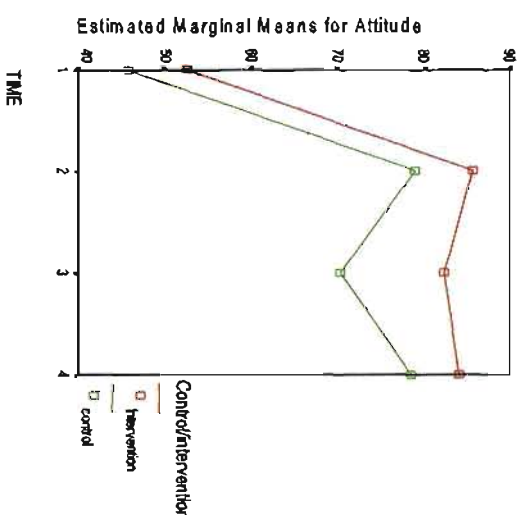


Figure 19c. Estimated Attitude Marginal Mean

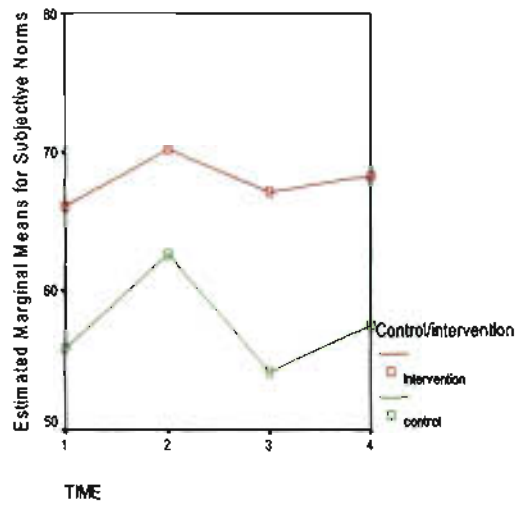


Figure 19d. Estimated Subjective Norms Marginal Mean

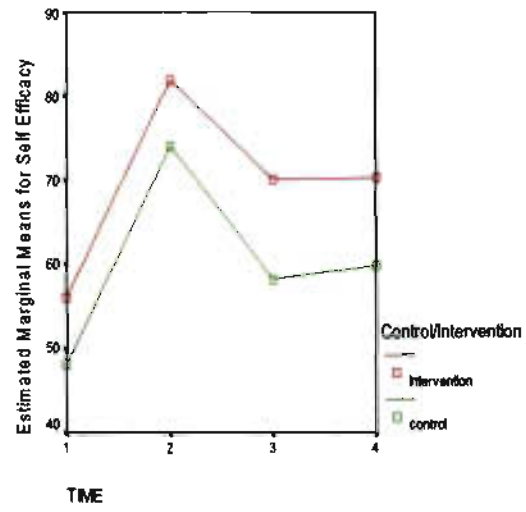


Figure 19e. Estimated Self-Efficacy Marginal Mean

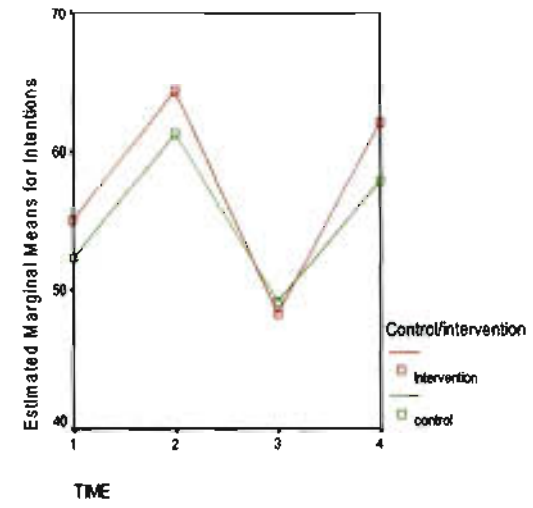


Figure 19f. Estimated Intentions Marginal Mean

Table 49. Comparison of Mean Changes in Determinants of Sexual Behaviour between Intervention and Control Groups from T1-T4

Determinants of Sexual Behaviour T1-4	Control/Intervention T1	N	Mean	SD	SE	t	P value
Knowledge Score	intervention	254	2.34	18.52	1.16	1.58	0.11
	control	118	-1.04	20.32	1.87		
Beliefs	intervention	249	0.96	26.50	1.67	0.92	0.35
	control	110	-1.85	26.87	2.56		
Attitude	intervention	227	29.52	20.61	1.36	0.93	0.35
	control	96	26.95	26.87	2.74		
Subjective norms	intervention	224	1.31	26.13	1.75	0.30	0.76
	control	88	0.25	32.45	3.46		
Self-efficacy	intervention	223	12.86	24.89	1.66	1.93	0.06
	control	89	8.60	28.35	3.00		
Intention	intervention	219	5.53	28.18	1.90	1.39	0.16
	control	96	0.63	29.96	3.05		

t test

No statistically significant differences between Intervention and Control groups with regard to changes in knowledge-, belief-, attitudes-, subjective norms, self-efficacy and intention- score percentage from T1-T4.

Figure 20. Correlations for Determinants of Sexual Behaviour for Subjective Norms and Attitudes from T1-T4

Key: SN-subjective norms, B- beliefs, I- intentions, A- attitude, SE-self-efficacy, K-knowledge, T- Time

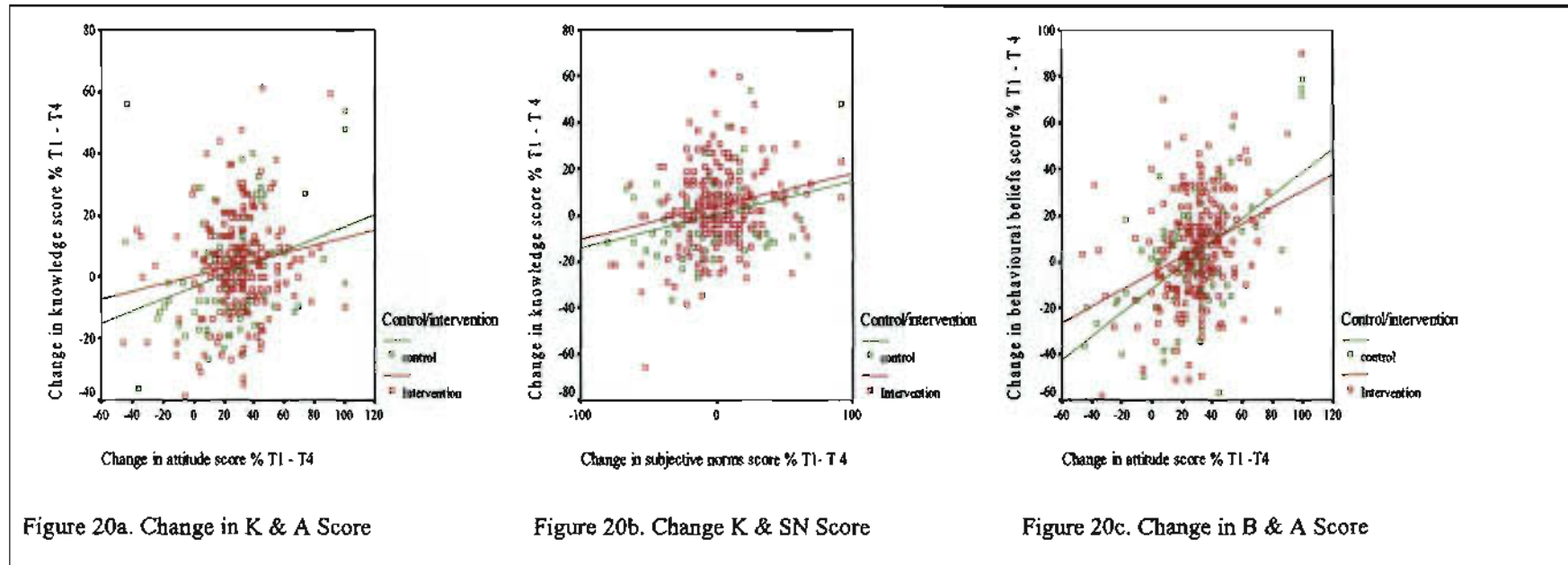


Figure 20a. Change in K & A Score

Figure 20b. Change K & SN Score

Figure 20c. Change in B & A Score

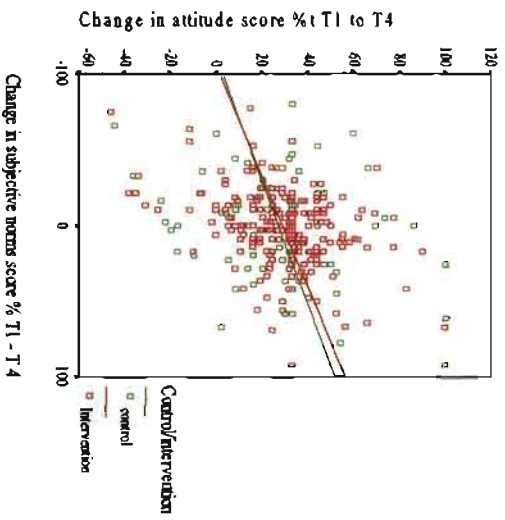


Figure 20d. Change in A & N Score

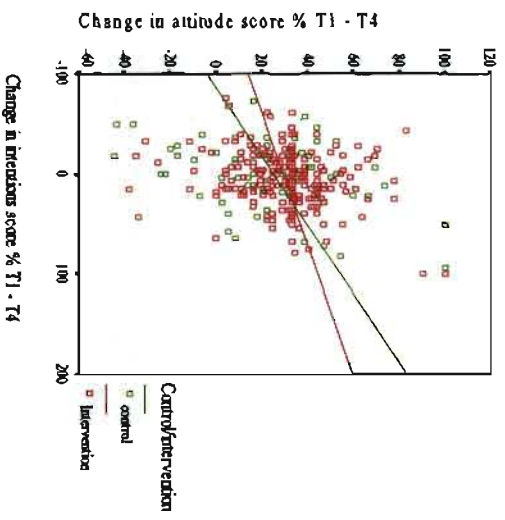


Figure 20e. Change in A & I Score

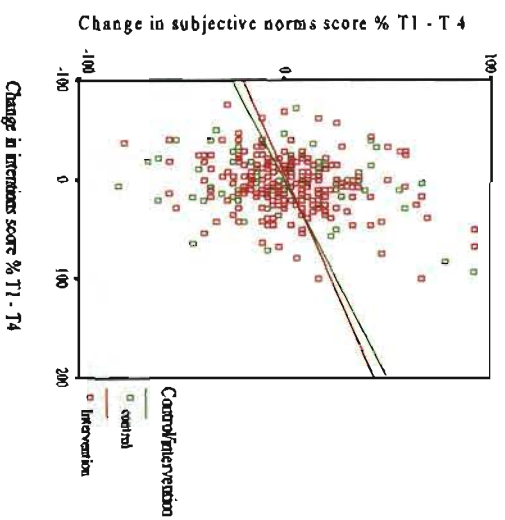


Figure 20f. Change in SN & I Score

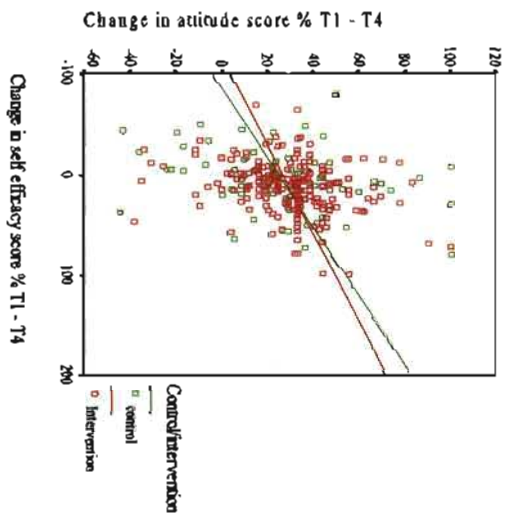


Figure 20g. Change in A & SE Score

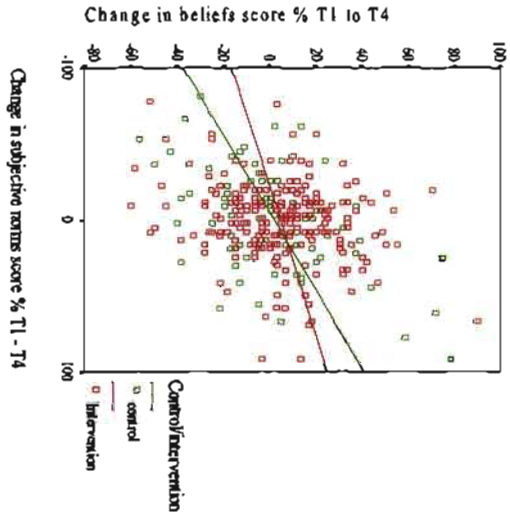


Figure 20h. Change in B & SN Score

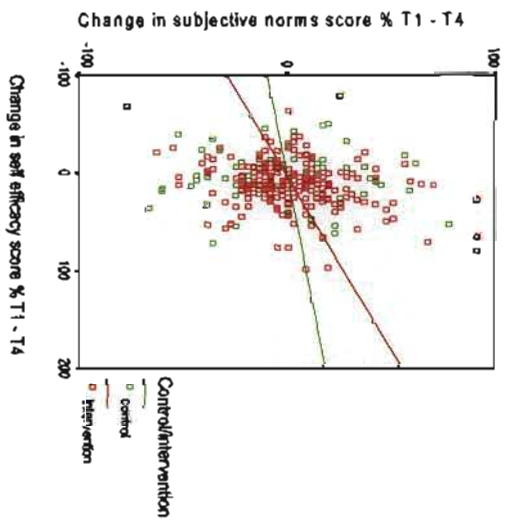


Figure 20i. Change in SN & SE Score

As beliefs increased so did the attitudes, showing that the relationship was not the same between the intervention and control groups. Similarly the relationship between the intervention and control groups was not the same between knowledge and attitudes, knowledge and subjective norms, attitudes and subjective norms, attitudes and intentions, subjective norms and intentions, attitudes and self-efficacy, beliefs and subjective norms and subjective norms and self-efficacy. The relationship between knowledge and subjective norms was however similar, between the intervention and control groups.

Drop-out Analysis from Time 1 to Time 4

This section focuses on analyzing the number of learners that dropped out between time points (T1 to T2, T1 to T3 and T1 to T4). It further examines whether there were differences between drop-outs and non drop-outs with respect to demographic and behavioural characteristics and intervention and control group differences. **Drop-outs** were defined as learners who had not completed all four questionnaires. In T1, the total number of learners present was 760; at T2 the number decreased to 664, and further decreased to 474 at T3 and 301 in T4.

Statistically significant differences were found between T1-T3 ($P < 0.001$) only. Over a third of learners dropped out in this time period. Higher percentages of drop-outs were found between T1-T3 and between T1-T4, and more within the control group than the intervention group. Over time there was an increase in drop-out rate from 12.6%, to 37.6% to 60.4% .

The Prevalence of Drop-outs between Time Points

The prevalence of drop-outs can only be measured against the number that was present at T1, i.e.760. This analysis doesnot take into account those who entered the cohort after T1. This analysis therefore excludes the 45 that were not present in T1.

Table 50. Prevalence of Drop Outs and Non Drop outs of Learners, Showing Differences between Intervention and Control Groups from T1-T2, T1-T3 and T1-T4 (n/%)

Drop-out vs. non Drop-outs	I n = 521	C n = 239	Total n = 760	P value
T1-T2				
Yes	71 (13.6)	25 (10.5)	96 (12.6)	0.22
No	450 (86.4)	214 (89.5)	664 (87.4)	
T1-T3				
Yes	168 (32.2)	118 (49.4)	286 (37.6)	< 0.001
No	353 (67.8)	121 (50.6)	474 (62.4)	
T1-T4				
Yes	307 (58.9)	152 (63.6)	459 (60.4)	0.22
No	214 (41.1)	87 (36.4)	301 (39.6)	

I-intervention group; C-control group, Pearson Chi square

At T1-T3 there were significantly more controls than cases that dropped out but not in T1-T4 or T1-T2.

The following section will examine whether the learners who dropped out differed from the learners who did not drop-out in terms of demographic and behavioural characteristics of learners and between intervention and control groups.

Sexual Behaviour of Drop-outs between Time Points

Table 50. Comparison of Responses of Drop-outs vs. Non Drop-outs Showing Associations between Sexual Behaviours and Intervention and Control Groups for T1-T2 (n/%)

Sexual Behaviours	I		C		Total n	P Value
	Drop-Out-Yes	Drop-Out-No	Drop-Out-Yes	Drop-Out-No		
Ever had sex Yes	34 (19.2)	143 (80.8)	8 (9.3)	78 (90.7)	263	0.04
Condom use at last sex Yes	24 (20.7)	92 (79.3)	5 (13.5)	32 (86.5)	153	0.33
Condom use at every sex Yes	18 (16.7)	90 (83.3)	4 (12.9)	27 (87.1)	139	0.61
Alcohol Use at Last Sex Yes	11 (20.8)	42 (79.2)	1 (9.1)	10 (90.9)	64	0.36
Reduced Partners in the past three months Yes	7(21.9)	25 (78.1)	14 (93.3)	14 (93.3)	60	0.19

I-intervention group; C-control group, Pearson Chi square intra-group test

Table 51. Comparison of Responses of Drop-outs vs. Non Drop-outs Showing Associations between Sexual Behaviours and Intervention and Control Groups for T1-T3 (n/%)

Sexual Behaviours	I		C		Total n	P Value
	Drop-Out-Yes	Drop-Out-No	Drop-Out-Yes	Drop-Out-No		
Ever had sex Yes	79 (44.6)	98 (55.4)	51 (59.3)	35 (40.7)	263	0.03
Condom use at last sex Yes	57 (49.1)	59 (50.9)	26 (70.3)	11 (29.7)	153	0.03
Condom use at every sex Yes	53(49.1)	55 (50.9)	22 (71.0)	9 (29.0)	139	0.03
Alcohol use at last Sex Yes	35 (66.0)	18 (34.0)	6 (54.5)	5 (45.5)	64	0.47
Reduced partners in the past three months Yes	15 (46.9)	17 (53.1)	9 (60.0)	6 (40.0)	47	0.40

I-intervention group; C-control group, Pearson Chi square intra-group test

Table 52. Comparison of Responses of Drop-outs vs. Non Drop-outs Showing Associations between Sexual Behaviours and Intervention and Control Groups for T1-T4 (n/%)

Sexual Behaviours	I		C		Total n	P Value
	Drop-Out-Yes	Drop-Out-No	Drop-Out-Yes	Drop-Out-No		
Ever had sex <i>Yes</i>	133 (75.1)	44 (24.9)	67 (77.9)	19 (22.1)	263	0.62
Condom use at last sex <i>Yes</i>	24 (20.7)	92 (79.3)	5 (13.5)	32 (86.5)	153	0.33
Condom use at every sex <i>Yes</i>	85 (78.7)	23 (21.3)	28 (90.3)	3 (9.7)	139	0.14
Alcohol Use at Last Sex <i>Yes</i>	48 (90.6)	5 (9.4)	9 (81.8)	2 (18.2)	64	0.39
Reduced Partners in the past three months <i>Yes</i>	25 (78.1)	7 (21.9)	13 (86.7)	2 (13.3)	47	0.48

I-intervention group; C-control group, Pearson Chi square intra-group test

Summary of Sexual Behaviour of Drop-outs between Time Points

From T1-T4 learners dropped out irrespective of sexual behaviours and which group learners belonged to.

Between T1-T3 statistically significant differences were reported between drop-outs and non drop-outs and between intervention and control groups for sexually active learners ($P = 0.04$), for those that used condom at last sex ($P = 0.03$) and at every sex ($P = 0.03$). More control group than intervention group learners dropped out for these sexual behaviours.

Between T1-T2 statistically significant differences between drop-outs and non drop-outs and between intervention and control groups for ever had sex ($P = 0.04$), was found. More intervention learners than control learners dropped out in this time period.

Demographic Factors of Drop-outs between Time Points

Table 53. Comparison of Responses of Drop-outs vs. Non Drop-outs Showing Associations between Age, Gender and Race between Intervention and Control Groups T1-T2 (n/%)

Demographic Factors	I		C		Total n	P Value
	Drop-Out-Yes	Drop-Out-No	Drop-Out-Yes	Drop-Out-No		
Age (years)						
14	9 (9.9)	82 (90.1)	3(11.1)	24 (88.9)	118	0.85
15	26 (11.1)	208 (88.9)	9 (10.0)	81 (90.0)	324	0.77
16	20 (16.7)	100 (83.3)	7 (10.3)	61 (89.7)	188	0.23
17-20	15 (20.3)	59 (79.7)	6 (11.1)	48 (88.9)	128	0.17
Gender						
Female	39 (13.3)	255 (86.7)	19 (13.1)	126 (86.9)	439	0.96
Male	32 (14.2)	194 (85.8)	6 (6.4)	88 (93.6)	320	0.05
Race						
Coloured	60 (16.3)	309 (83.7)	5 (10.4)	43 (89.6)	417	0.29
Indian*	3 (17.6)	14 (82.4)	*	*	17	*
Black	4 (3.3)	119 (96.7)	20 (10.5)	170 (89.5)	313	0.02
Whites & Others	3 (30.0)	7 (70.0)	*	1 (100.0)	11	0.52

* C/I in T1 is constant, no statistics computed. I-intervention group; C-control group
Pearson Chi square intra-group test

Table 54. Comparison of Responses of Drop-outs vs. Non Drop-outs Showing Associations between Age, Gender and Race between Intervention and Control Groups T1-T3 (n/%)

Demographic Factors	I		C		Total n	P Value
	Drop-Out-Yes	Drop-Out-No	Drop-Out-Yes	Drop-Out-No		
Age (years)						
14	17 (18.7)	74 (81.3)	9(33.3)	18 (66.7)	118	0.10
15	72 (30.8)	162 (69.2)	40(44.4)	50 (55.6)	324	0.02
16	48 (40.0)	72 (60.0)	37(54.4)	31 (45.6)	188	0.06
17-20	30 (40.5)	44 (59.5)	32(59.3)	22 (40.7)	128	0.04
Gender						
Female	91 (31.0)	203 (69.0)	70 (48.3)	75 (51.7)	439	<0.001
Male	77 (34.1)	149 (65.99)	48 (51.1)	46 (48.9)	320	<0.005
Race						
Coloured	135 (36.6)	234 (63.4)	35 (72.9)	13 (27.1)	417	<0.001
Indian*	8 (47.1)	9 (52.9)	*	*	17	*
Black	17 (13.8)	106 (86.2)	83 (43.7)	107(56.3)	313	<0.001
Whites & Others	7 (70.0)	3 (30.0)	0 (0.0)	1 (100.0)	11	0.16

C/I in T1 is constant, no statistics computed. I-intervention group; C-control group
Pearson Chi square intra-group test

Table 55. Comparison of Responses of Drop-outs vs. Non Drop-outs Showing Associations between Age, Gender and Race between Intervention and Control Groups T1-T4 (n/%)

Demographic Factors	I		C		Total n	P Value
	Drop-Out-Yes	Drop-Out-No	Drop-Out-Yes	Drop-Out-No		
Age (years)						
14	34 (37.4)	57(62.6)	13 (48.1)	14 (51.6)	118	0.32
15	132(56.4)	102 (43.6)	52 (57.8)	38 (42.2)	324	0.82
16	82 (68.3)	38 (31.7)	44 (64.7)	24 (35.3)	188	0.61
17-20	57(77.0)	17 (23.0)	43 (79.6)	11 (20.4)	128	0.73
Gender						
Female	161 (54.8)	133 (45.2)	85 (58.6)	60 (41.4)	439	0.44
Male	146 (64.6)	80 (35.4)	67 (71.3)	27 (28.7)	320	0.25
Race						
Coloured	227 (61.5)	142 (38.5)	38 (79.2)	10 (20.8)	417	0.02
Indian*	12 (70.6)	5 (29.4)	*	*	17	*
Black	59 (48.0)	64 (52.0)	113 (59.5)	77 (40.5)	313	0.05
Whites & Others	7 (70.0)	3 (30.0)	1 (100.0)	0 (0.0)	11	0.52

* *CI* in T1 are constant, no statistics computed. I-intervention group; C-control group
Pearson Chi square intra-group test

Summary of Demographic factors of Drop-outs between Time Points

Between T1-T4 no age, gender or race differences were reported for drop-outs between intervention and control groups and between learners that dropped out and those that did not drop-out. However, statistically significant differences were reported for the Coloured race group only ($P = 0.02$). More control group Coloured learners than intervention group learners dropped out of the study over time. Between T1-T2 there were no age, gender or race differences in drop-outs between intervention and control groups and between learners that dropped out and those that did not drop-out. However significant differences were reported in drop-outs for the Black race group between intervention and control groups and between drop-outs and non drop-outs ($P = 0.02$). More control group Black learners dropped out than intervention group Black learners. Between T1-T3 statistically significant differences are reported for certain demographics factors between intervention and control groups and between drop-outs and non drop-outs. This was especially so between 15 year old learners ($P = 0.02$) and 17 to 20 year olds ($P = 0.04$). More control group learners dropped out than intervention group learners for both these age groups. Similarly statistically significant differences were reported between genders, i.e. females ($P < 0.001$) and males ($P < 0.005$). More control group learners than intervention group learners dropped out of the study for both genders. Statistically significant differences were also reported for the Coloured ($P < 0.001$) and the Black

race group ($P < 0.001$). More control group than intervention group learners dropped out of the study in these race groups.

Evaluation of the Theoretical Model

The Theory of Planned Behaviour (Ajzen, 1985) which is an extension of the Theory of Reasoned Action (Fishbein and Ajzen, 1975) proposes that for behaviour change to occur an individual's attitude towards performing the behaviour, together with their beliefs, subjective norms and self-efficacy, influence their intentions of whether or not to change behaviour. The model was analyzed statistically to evaluate whether components of the model were correlated to each other.

Table 56. Showing Correlation between Attitudes, Beliefs, Subjective Norms, Self-Efficacy and Intentions to Change Behaviour

Intentions	Coefficient	P Value	CI (95%)
Attitude	0.39	< 0.001	0.33, 0.45
Beliefs	0.50	< 0.001	0.44, 0.56
Subjective Norms	0.33	< 0.001	0.28, 0.39
Self-Efficacy	0.43	< 0.001	0.39, 0.48

Correlation

Table 56 a shows positive correlation between attitudes and intentions, beliefs and intentions, subjective norms and intentions, self-efficacy and intentions in keeping with the Theory of Reasoned Action. Attitudes were 39.52% correlated with intentions ($P < 0.001$), beliefs were 50.39% positively correlated with intentions ($P < 0.001$), subjective norms were 33.72% correlated with intentions ($P < 0.001$) and self-efficacy was 43.75% correlated with intentions ($P < 0.001$). Therefore attitudes, beliefs, subjective norms and self-efficacy were statistically significantly correlated with intentions which support the theoretical framework. The positive correlation of attitudes, beliefs, subjective norms and self-efficacy with intentions to change behaviour draws support for the theoretical framework of this study. This framework is used to explain behaviour change in the context of the discussion in the impact analysis.

Table 57. Showing Crude and Adjusted ORs and P values for Demographic factors –School, Group, Sex, Age, Race, Religion, Employment of Parents, Living with and Type of Work of Parents.

Demographic factor	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
School		0.850		
2 vs 1	0.99 (0.68 – 1.43)	0.959		
3 vs 1	1.09 (0.77 – 1.56)	0.621		
Intervention vs. control	1.10 (0.80 – 1.52)	0.570		
Sex (male vs. female)	4.09 (2.98 – 5.62)	<0.001	4.10 (2.92 – 5.77)	<0.001
Age category		<0.001		
15 vs 14	1.58 (0.91 – 2.72)	0.101	1.63 (0.92 – 2.89)	0.097
16 vs 14	4.13 (2.36 – 7.23)	<0.001	3.99 (2.20 – 7.24)	<0.001
17-20 vs 14	7.82 (4.30 – 14.23)	<0.001	7.59 (4.01 – 14.35)	<0.001
Race		0.065		
Indian vs coloured	0.80 (0.28 – 2.32)	0.682		
Black vs coloured	1.05 (0.77 – 1.43)	0.771		
White and others vs coloured	5.12 (1.34 – 19.62)	0.017		
Religion		<0.001		
Moslem/Hindu vs Christian	0.77 (0.30 – 2.00)	0.593	0.78 (0.28 – 2.19)	0.634
African traditional vs Christian	2.20 (1.29 – 3.74)	0.004	2.07 (1.15 – 3.75)	0.016
No religion vs Christian	7.53 (2.08 – 27.31)	0.002	5.13 (1.30 – 20.31)	0.020
Missing vs Christian	3.08 (0.51 – 18.59)	0.219	2.20 (0.33 – 14.56)	0.414
Employment of parents		0.287		
Unemployed vs employed	0.94 (0.56 – 1.57)	0.818		
Missing vs employed	0.64 (0.36 – 1.12)	0.117		
Living with		0.273		
Others vs both parents	0.89 (0.66 – 1.21)	0.455		
Missing vs both parents	2.06 (0.68 – 6.26)	0.204		
Work of parents		0.914		
Clerical vs professional	0.80 (0.24 – 2.67)	0.717		
Artisan vs professional	1.18 (0.78 – 1.78)	0.425		
Labourer vs professional	0.90 (0.56 – 1.46)	0.667		
Casual self emp vs professional	0.96 (0.58 – 1.61)	0.889		
Unemployed vs professional	0.96 (0.55 – 1.66)	0.877		

Logistic model for sexactil, goodness-of-fit test

```

number of observations =      753
number of covariate patterns =    34
    Pearson chi2(25) =    37.51
        Prob > chi2 =    0.0516

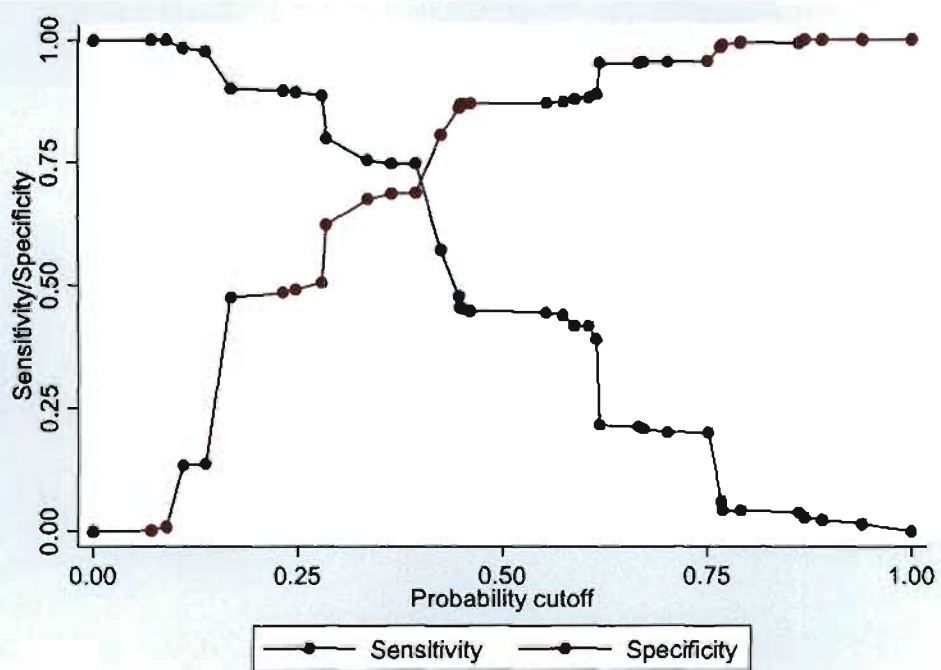
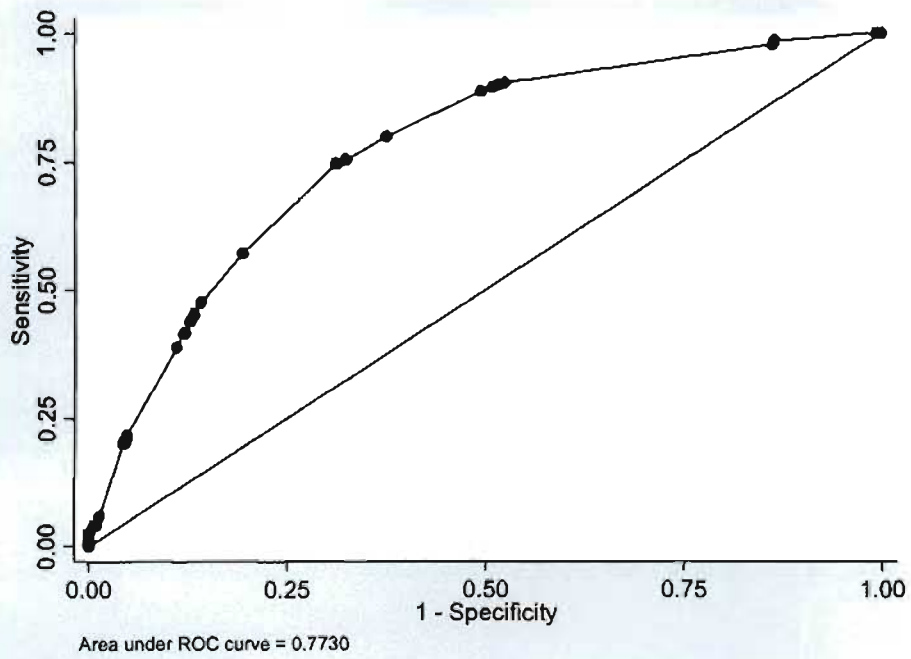
```

Logistic model for sexactil

```

number of observations =      753
area under ROC curve   =    0.7730

```



This is a copy of the log of the whole process from bivariate analyses to logistic regression using likelihood ratio tests, goodness of fit tests etc. also assessment of interaction effects to arrive at final model

```
log: C:\Documents and Settings\Administrator\My Documents\Consulting\Comm Health
department\Serena Frank\Corrections April 2008\21 m
> ay logistic ever had sex demographics 1.log
log type: text
opened on: 21 May 2008, 09:24:22
```

Bivariate analysis using Pearson's chi square tests for demographic risk factors for ever had sex (time 1)

```
. tab school sexact1, row chi2
```

```
+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+
```

school	sexually acitve at T1		Total
	no	yes	
1	203 65.48	107 34.52	310 100.00
2	136 65.70	71 34.30	207 100.00
3	151 63.45	87 36.55	238 100.00
Total	490 64.90	265 35.10	755 100.00

Pearson chi2(2) = 0.3257 Pr = 0.850

```
. tab contint1 sexact1, row chi2
```

```
+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+
```

Control/inte rvention time 1	sexually acitve at T1		Total
	no	yes	
Intervention	339 65.57	178 34.43	517 100.00
control	151 63.45	87 36.55	238 100.00
Total	490 64.90	265 35.10	755 100.00

Pearson chi2(1) = 0.3231 Pr = 0.570

. tab numberinterventions sexacti1, row chi2

```

+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+

```

Number of interventions	sexually acitve at T1		Total
	no	yes	
0	151 63.45	87 36.55	238 100.00
1	203 65.48	107 34.52	310 100.00
2	136 65.70	71 34.30	207 100.00
Total	490 64.90	265 35.10	755 100.00

Pearson chi2(2) = 0.3257 Pr = 0.850

. tab sex1 sexacti1, row chi2

```

+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+

```

sex	sexually acitve at T1		Total
	no	yes	
female	342 78.08	96 21.92	438 100.00
male	147 46.52	169 53.48	316 100.00
Total	489 64.85	265 35.15	754 100.00

Pearson chi2(1) = 80.2306 Pr = 0.000

. tab agecat sexacti1, row chi2

```

+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+

```

age | sexually acitve at T1

category	no	yes	Total
14	97 82.91	20 17.09	117 100.00
15	243 75.47	79 24.53	322 100.00
16	101 54.01	86 45.99	187 100.00
17-20	49 38.28	79 61.72	128 100.00
Total	490 64.99	264 35.01	754 100.00

Pearson chi2(3) = 82.0709 Pr = 0.000

. tab racecat sexact1, row chi2

Key
frequency
row percentage

race category	sexually active at T1		Total
	no	yes	
coloured	273 65.78	142 34.22	415 100.00
indian	12 70.59	5 29.41	17 100.00
black	202 64.74	110 35.26	312 100.00
white and others	3 27.27	8 72.73	11 100.00
Total	490 64.90	265 35.10	755 100.00

Pearson chi2(3) = 7.2237 Pr = 0.065

. tab relcat sexact1, row chi2

Key
frequency
row percentage

religion category	sexually acitve at T1		Total
	no	yes	
christian	440 67.28	214 32.72	654 100.00

moslem/hindu	16	6	22
	72.73	27.27	100.00
african trad	29	31	60
	48.33	51.67	100.00
no religion	3	11	14
	21.43	78.57	100.00
missing	2	3	5
	40.00	60.00	100.00
Total	490	265	755
	64.90	35.10	100.00

Pearson chi2(4) = 22.4196 Pr = 0.000

. tab employca sexact1, row chi2

```

+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+

```

employment type	sexually acitve at T1		Total
	no	yes	
employed/self employe	393	222	615
	63.90	36.10	100.00
unemployed	47	25	72
	65.28	34.72	100.00
missing	50	18	68
	73.53	26.47	100.00
Total	490	265	755
	64.90	35.10	100.00

Pearson chi2(2) = 2.4961 Pr = 0.287

. tab livewcat sexact1, row chi2

```

+-----+
| Key   |
+-----+
|       |
| frequency |
| row percentage |
+-----+

```

Live with categorised	sexually acitve at T1		Total
	no	yes	
both parents	215	122	337
	63.80	36.20	100.00
all others	269	136	405

	66.42	33.58	100.00
missing	6	7	13
	46.15	53.85	100.00
Total	490	265	755
	64.90	35.10	100.00

Pearson chi2(2) = 2.5957 Pr = 0.273

. tab workcat sexactil, row chi2

```

+-----+
| Key   |
+-----+
| frequency |
| row percentage |
+-----+

```

work category	sexually acitve at T1		Total
	no	yes	
professional + manage	162 64.29	90 35.71	252 100.00
clerical	9 69.23	4 30.77	13 100.00
artisan	96 60.38	63 39.62	159 100.00
labourer	70 66.67	35 33.33	105 100.00
casual-self employed	56 65.12	30 34.88	86 100.00
unemployed	47 65.28	25 34.72	72 100.00
Total	440 64.05	247 35.95	687 100.00

Pearson chi2(5) = 1.4908 Pr = 0.914

Logistic regression analysis for crude (unadjusted) odds ratios for all demographic factors

```

. xi: logistic sexactil i.school
i.school      _Ischool_1-3

```

(naturally coded; _Ischool_1 omitted)

```

Logistic regression      Number of obs =      755
                        LR chi2(2) =      0.32
                        Prob > chi2 =      0.8502
Log likelihood = -489.12253      Pseudo R2 =      0.0003

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Ischool_2	.990448	.1871642	-0.05	0.959	.6838815	1.434441
_Ischool_3	1.093087	.1967212	0.49	0.621	.7681837	1.555407

```

-----
. xi: logistic sexactil i.contint1
i.contint1      _Icontint1_1-2      (naturally coded; _Icontint1_1 omitted)

Logistic regression              Number of obs   =       755
                                LR chi2(1)       =         0.32
                                Prob > chi2       =       0.5704
Log likelihood = -489.12382      Pseudo R2      =       0.0003

```

```

-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
_Icontint1_2 |   1.097291   .1792472     0.57  0.570     .796663   1.511365
-----+-----

```

```

. xi: logistic sexactil i.numberinterventions
i.numberinter~s  _Inumberint_0-2      (naturally coded; _Inumberint_0 omitted)

Logistic regression              Number of obs   =       755
                                LR chi2(2)     =         0.32
                                Prob > chi2    =       0.8502
Log likelihood = -489.12253      Pseudo R2      =       0.0003

```

```

-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
_Inumberin-1 |   .9148406   .1646425    -0.49  0.621     .6429185  1.301772
_Inumberin-2 |   .9061021   .1802078    -0.50  0.620     .6136039  1.338031
-----+-----

```

```

. xi: logistic sexactil i.sex1
i.sex1          _Isex1_1-2          (naturally coded; _Isex1_1 omitted)

Logistic regression              Number of obs   =       754
                                LR chi2(1)     =       80.51
                                Prob > chi2    =       0.0000
Log likelihood = -448.59725      Pseudo R2      =       0.0823

```

```

-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
_Isex1_2 |   4.095663   .661174     8.73  0.000     2.984781  5.619996
-----+-----

```

```

. xi: logistic sexactil i.agecat
i.agecat        _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)

Logistic regression              Number of obs   =       754
                                LR chi2(3)    =       82.26
                                Prob > chi2    =       0.0000
Log likelihood = -447.1086      Pseudo R2      =       0.0842

```

```

-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
_Iagecat_2 |   1.576749   .4377621     1.64  0.101     .9150366  2.716981
_Iagecat_3 |   4.129703   1.181392     4.96  0.000     2.357295  7.234752
_Iagecat_4 |   7.819388   2.389391     6.73  0.000     4.296046 14.23235
-----+-----

```

```

. xi: logistic sexactil age

```

```

Logistic regression                               Number of obs   =       755
                                                  LR chi2(1)      =       79.58
                                                  Prob > chi2     =       0.0000
Log likelihood = -449.49532                    Pseudo R2      =       0.0813

```

```

-----+-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
age      |  1.878465    .1442616     8.21  0.000     1.615969    2.183602
-----+-----

```

Note: 0 failures and 1 success completely determined.

```

. xi: logistic sexactil i.racecat
i.racecat      _Iracecat_1-4      (naturally coded; _Iracecat_1 omitted)

```

```

Logistic regression                               Number of obs   =       755
                                                  LR chi2(3)      =        6.85
                                                  Prob > chi2     =       0.0769
Log likelihood = -485.86046                    Pseudo R2      =       0.0070

```

```

-----+-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
_Iracecat_2 | .8010563    .4343754    -0.41  0.682     .2767555    2.318622
_Iracecat_3 |  1.046925    .1646925     0.29  0.771     .7691526    1.425013
_Iracecat_4 |  5.126761    3.511133     2.39  0.017     1.339325    19.62457
-----+-----

```

```

. xi: logistic sexactil i.relcacat
i.relcacat      _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

```

Logistic regression                               Number of obs   =       755
                                                  LR chi2(4)      =       21.49
                                                  Prob > chi2     =       0.0003
Log likelihood = -478.53809                    Pseudo R2      =       0.0220

```

```

-----+-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
_Irelcat_2 | .771028     .3746532    -0.54  0.593     .2974812    1.998393
_Irelcat_3 |  2.197873    .5966181     2.90  0.004     1.291046    3.741652
_Irelcat_4 |  7.538941    4.950439     3.08  0.002     2.081467    27.30556
_Irelcat_5 |  3.084112    2.827105     1.23  0.219     .5115187    18.59511
-----+-----

```

```

. xi: logistic sexactil i.employca
i.employca      _Iemployca_1-3      (naturally coded; _Iemployca_1 omitted)

```

```

Logistic regression                               Number of obs   =       755
                                                  LR chi2(2)      =        2.60
                                                  Prob > chi2     =       0.2728
Log likelihood = -487.98595                    Pseudo R2      =       0.0027

```

```

-----+-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
_Iemployca_2 | .9416331    .2461351    -0.23  0.818     .5641371    1.571733
_Iemployca_3 | .6372973    .1831657    -1.57  0.117     .3628258    1.119402
-----+-----

```

```

. xi: logistic sexactil i.livewcat
i.livewcat      _Ilivewcat_1-3      (naturally coded; _Ilivewcat_1 omitted)

```

```

Logistic regression
Log likelihood = -488.03845
Number of obs = 755
LR chi2(2) = 2.49
Prob > chi2 = 0.2875
Pseudo R2 = 0.0025

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Ilivewcat_2	.8909745	.137794	-0.75	0.455	.6579946	1.206447
_Ilivewcat_3	2.056011	1.167357	1.27	0.204	.6756659	6.256318

```

. xi: logistic sexactil i.workcat
i.workcat      _Iworkcat_1-6      (naturally coded; _Iworkcat_1 omitted)

```

```

Logistic regression
Log likelihood = -447.97102
Number of obs = 687
LR chi2(5) = 1.49
Prob > chi2 = 0.9147
Pseudo R2 = 0.0017

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Iworkcat_2	.8	.4921094	-0.36	0.717	.2395988	2.671132
_Iworkcat_3	1.18125	.2465776	0.80	0.425	.7846202	1.778378
_Iworkcat_4	.9	.2207131	-0.43	0.667	.5565402	1.45542
_Iworkcat_5	.9642857	.2523306	-0.14	0.889	.5773864	1.610441
_Iworkcat_6	.9574468	.2683595	-0.16	0.877	.5527571	1.658422

Logistic regression analysis - backward elimination method using likelihood ratio tests starting with all factors significant in bivariate analysis

```

. xi: logistic sexactil i.school i.contint1 i.agecat i.sex1 i.racecat i.relc
i.school      _Ischool_1-3      (naturally coded; _Ischool_1 omitted)
i.contint1    _Icontint1_1-2    (naturally coded; _Icontint1_1 omitted)
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.racecat     _Iracecat_1-4     (naturally coded; _Iracecat_1 omitted)
i.relc        _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

note: _Icontint1_2 dropped because of collinearity

```

Logistic regression
Log likelihood = -402.94542
Number of obs = 753
LR chi2(13) = 169.72
Prob > chi2 = 0.0000
Pseudo R2 = 0.1740

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Ischool_2	.950617	.2175016	-0.22	0.825	.607086	1.488541
_Ischool_3	.9302485	.2350328	-0.29	0.775	.566941	1.526371
_Iagecat_2	1.629571	.4801496	1.66	0.097	.9146786	2.903207
_Iagecat_3	4.10586	1.255179	4.62	0.000	2.255216	7.475152
_Iagecat_4	7.599071	2.51149	6.14	0.000	3.97593	14.52387
_Isex1_2	3.992679	.6978109	7.92	0.000	2.834638	5.623816
_Iracecat_2	1.151736	.7187693	0.23	0.821	.3389533	3.913508
_Iracecat_3	.8143212	.1864419	-0.90	0.370	.5198882	1.275503
_Iracecat_4	2.588017	1.94819	1.26	0.207	.5918418	11.31693
_Irelcat_2	.6762904	.3776362	-0.70	0.484	.2263746	2.020406

_Irelcat_3		2.432528	.7844326	2.76	0.006	1.292902	4.576676
_Irelcat_4		5.521666	3.892483	2.42	0.015	1.386813	21.98479
_Irelcat_5		2.591816	2.519414	0.98	0.327	.385639	17.41917

```

. xi: logistic sexactil i.school i.agecat i.sex1 i.racecat i.relc
i.school      _Ischool_1-3      (naturally coded; _Ischool_1 omitted)
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.racecat     _Iracecat_1-4     (naturally coded; _Iracecat_1 omitted)
i.relc       _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

```

Logistic regression                               Number of obs   =          753
                                                  LR chi2(13)    =          169.72
                                                  Prob > chi2    =           0.0000
Log likelihood = -402.94542                       Pseudo R2      =           0.1740

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Ischool_2	.950617	.2175016	-0.22	0.825	.607086 1.488541
_Ischool_3	.9302485	.2350328	-0.29	0.775	.566941 1.526371
_Iagecat_2	1.629571	.4801496	1.66	0.097	.9146786 2.903207
_Iagecat_3	4.10586	1.255179	4.62	0.000	2.255216 7.475152
_Iagecat_4	7.599071	2.51149	6.14	0.000	3.97593 14.52387
_Isex1_2	3.992679	.6978109	7.92	0.000	2.834638 5.623816
_Iracecat_2	1.151736	.7187693	0.23	0.821	.3389533 3.913508
_Iracecat_3	.8143212	.1864419	-0.90	0.370	.5198882 1.275503
_Iracecat_4	2.588017	1.94819	1.26	0.207	.5918418 11.31693
_Irelcat_2	.6762904	.3776362	-0.70	0.484	.2263746 2.020406
_Irelcat_3	2.432528	.7844326	2.76	0.006	1.292902 4.576676
_Irelcat_4	5.521666	3.892483	2.42	0.015	1.386813 21.98479
_Irelcat_5	2.591816	2.519414	0.98	0.327	.385639 17.41917

```

. est store a

```

```

. xi: logistic sexactil i.agecat i.sex1 i.racecat i.relc
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.racecat     _Iracecat_1-4     (naturally coded; _Iracecat_1 omitted)
i.relc       _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

```

Logistic regression                               Number of obs   =          753
                                                  LR chi2(11)    =          169.63
                                                  Prob > chi2    =           0.0000
Log likelihood = -402.99011                       Pseudo R2      =           0.1739

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	1.629687	.4793793	1.66	0.097	.915629 2.900606
_Iagecat_3	4.096256	1.248253	4.63	0.000	2.25424 7.443443
_Iagecat_4	7.58208	2.491256	6.17	0.000	3.982059 14.43674
_Isex1_2	3.989926	.6971513	7.92	0.000	2.832932 5.619445
_Iracecat_2	1.147435	.7132739	0.22	0.825	.3393126 3.880217
_Iracecat_3	.7860206	.1521173	-1.24	0.213	.5379008 1.148592
_Iracecat_4	2.589362	1.944466	1.27	0.205	.5942759 11.28229
_Irelcat_2	.682989	.3802101	-0.68	0.493	.2293835 2.033599
_Irelcat_3	2.420513	.7767755	2.75	0.006	1.290462 4.540143
_Irelcat_4	5.440689	3.82052	2.41	0.016	1.373819 21.54658
_Irelcat_5	2.585528	2.507295	0.98	0.327	.3864587 17.29798

. est store b

. lrtest a b

```

Likelihood-ratio test                LR chi2(2) =      0.09
(Assumption: b nested in a)         Prob > chi2 =    0.9563

```

```

. xi: logistic sexactil i.agecat i.sex1 i.racecat i.relcat
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.racecat     _Iracecat_1-4     (naturally coded; _Iracecat_1 omitted)
i.relcat      _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

```

Logistic regression                  Number of obs   =      753
                                      LR chi2(11)      =     169.63
                                      Prob > chi2      =     0.0000
Log likelihood = -402.99011           Pseudo R2       =     0.1739

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	1.629687	.4793793	1.66	0.097	.915629 2.900606
_Iagecat_3	4.096256	1.248253	4.63	0.000	2.25424 7.443443
_Iagecat_4	7.58208	2.491256	6.17	0.000	3.982059 14.43674
_Isex1_2	3.989926	.6971513	7.92	0.000	2.832932 5.619445
_Iracecat_2	1.147435	.7132739	0.22	0.825	.3393126 3.880217
_Iracecat_3	.7860206	.1521173	-1.24	0.213	.5379008 1.148592
_Iracecat_4	2.589362	1.944466	1.27	0.205	.5942759 11.28229
_Irelcat_2	.682989	.3802101	-0.68	0.493	.2293835 2.033599
_Irelcat_3	2.420513	.7767755	2.75	0.006	1.290462 4.540143
_Irelcat_4	5.440689	3.82052	2.41	0.016	1.373819 21.54658
_Irelcat_5	2.585528	2.507295	0.98	0.327	.3864587 17.29798

. est store a

```

. xi: logistic sexactil i.agecat i.sex1 i.relcat
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcat      _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

```

Logistic regression                  Number of obs   =      753
                                      LR chi2(8)       =     165.87
                                      Prob > chi2      =     0.0000
Log likelihood = -404.86829           Pseudo R2       =     0.1700

```

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	1.62703	.4771692	1.66	0.097	.9157111 2.890898
_Iagecat_3	3.994963	1.211489	4.57	0.000	2.204866 7.238411
_Iagecat_4	7.588623	2.467837	6.23	0.000	4.011903 14.35409
_Isex1_2	4.103635	.7126178	8.13	0.000	2.9198 5.767456
_Irelcat_2	.7776651	.4112729	-0.48	0.634	.2758224 2.192581
_Irelcat_3	2.073982	.6256851	2.42	0.016	1.148185 3.746261
_Irelcat_4	5.133641	3.60194	2.33	0.020	1.297756 20.30757
_Irelcat_5	2.197681	2.120544	0.82	0.414	.3316192 14.5643

. est store b

. lrtest a b

Likelihood-ratio test
 (Assumption: b nested in a) LR chi2(3) = 3.76
 Prob > chi2 = 0.2890

```
. xi: logistic sexact1 i.agecat i.sex1 i.relc
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relc        _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)
```

Logistic regression
 Number of obs = 753
 LR chi2(8) = 165.87
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.1700
 Log likelihood = -404.86829

sexact1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	1.62703	.4771692	1.66	0.097	.9157111 2.890898
_Iagecat_3	3.994963	1.211489	4.57	0.000	2.204866 7.238411
_Iagecat_4	7.588623	2.467837	6.23	0.000	4.011903 14.35409
_Isex1_2	4.103635	.7126178	8.13	0.000	2.9198 5.767456
_Irelcat_2	.7776651	.4112729	-0.48	0.634	.2758224 2.192581
_Irelcat_3	2.073982	.6256851	2.42	0.016	1.148185 3.746261
_Irelcat_4	5.133641	3.60194	2.33	0.020	1.297756 20.30757
_Irelcat_5	2.197681	2.120544	0.82	0.414	.3316192 14.5643

. est store a

```
. xi: logistic sexact1 i.agecat i.sex1
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
```

Logistic regression
 Number of obs = 753
 LR chi2(4) = 153.19
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.1570
 Log likelihood = -411.21016

sexact1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	1.564686	.451556	1.55	0.121	.8887446 2.754718
_Iagecat_3	3.985516	1.190903	4.63	0.000	2.218906 7.158633
_Iagecat_4	7.912571	2.534508	6.46	0.000	4.223434 14.82414
_Isex1_2	4.080052	.6993926	8.20	0.000	2.91578 5.709218

. est store b

. lrtest a b

Likelihood-ratio test
 (Assumption: b nested in a) LR chi2(4) = 12.68
 Prob > chi2 = 0.0129

```
. xi: logistic sexact1 i.agecat i.sex1 i.relc
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relc        _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)
```

Logistic regression
 Number of obs = 753
 LR chi2(8) = 165.87
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.1700
 Log likelihood = -404.86829

sexactil	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	1.62703	.4771692	1.66	0.097	.9157111 2.890898
_Iagecat_3	3.994963	1.211489	4.57	0.000	2.204866 7.238411
_Iagecat_4	7.588623	2.467837	6.23	0.000	4.011903 14.35409
_Isex1_2	4.103635	.7126178	8.13	0.000	2.9198 5.767456
_Irelcat_2	.7776651	.4112729	-0.48	0.634	.2758224 2.192581
_Irelcat_3	2.073982	.6256851	2.42	0.016	1.148185 3.746261
_Irelcat_4	5.133641	3.60194	2.33	0.020	1.297756 20.30757
_Irelcat_5	2.197681	2.120544	0.82	0.414	.3316192 14.5643

Final model - logit

```
. xi: logit sexactil i.agecat i.sex1 i.relcac
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcac      _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)
```

```
Iteration 0:  log likelihood = -487.8053
Iteration 1:  log likelihood = -406.97565
Iteration 2:  log likelihood = -404.88431
Iteration 3:  log likelihood = -404.8683
Iteration 4:  log likelihood = -404.86829
```

```
Logistic regression                                Number of obs   =          753
                                                    LR chi2(8)      =          165.87
                                                    Prob > chi2     =           0.0000
Log likelihood = -404.86829                        Pseudo R2      =           0.1700
```

sexactil	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2	.4867564	.2932762	1.66	0.097	-.0880543 1.061567
_Iagecat_3	1.385034	.3032543	4.57	0.000	.7906667 1.979402
_Iagecat_4	2.02665	.3252022	6.23	0.000	1.389266 2.664035
_Isex1_2	1.411873	.1736553	8.13	0.000	1.071515 1.752231
_Irelcat_2	-.2514593	.5288561	-0.48	0.634	-1.287998 .7850796
_Irelcat_3	.7294704	.301683	2.42	0.016	.1381826 1.320758
_Irelcat_4	1.635815	.7016345	2.33	0.020	.2606369 3.010994
_Irelcat_5	.7874025	.9649007	0.82	0.414	-1.103768 2.678573
_cons	-2.32779	.2795942	-8.33	0.000	-2.875785 -1.779796

```
. estat gof
```

Logistic model for sexactil, goodness-of-fit test

```
number of observations =          753
number of covariate patterns =          34
Pearson chi2(25) =          37.51
Prob > chi2 =          0.0516
```

```
. lroc
```

Logistic model for sexactil

```
number of observations =          753
```

area under ROC curve = 0.7730

```
. graph save Graph "C:\Documents and Settings\Administrator\My Documents\Consulting\Comm Health department\Serena Frank\Corrections April 20 > 08\Graph lroc.gph", replace
(file C:\Documents and Settings\Administrator\My Documents\Consulting\Comm Health department\Serena Frank\Corrections April 2008\Graph lroc.
> gph saved)
```

. lsens

```
. graph save Graph "C:\Documents and Settings\Administrator\My Documents\Consulting\Comm Health department\Serena Frank\Corrections April 20 > 08\Graph lsens.gph", replace
(file C:\Documents and Settings\Administrator\My Documents\Consulting\Comm Health department\Serena Frank\Corrections April 2008\Graph lsens
> .gph saved)
```

Assessment of interaction effects

```
. xi: logistic sexact1 i.agecat i.sex1 i.relcacat i.agesex
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcacat    _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)
i.agesex      _Iagesex_1-8      (naturally coded; _Iagesex_1 omitted)
```

note: _Iagesex_6 dropped because of collinearity

note: _Iagesex_8 dropped because of collinearity

```
Logistic regression                               Number of obs =          753
                                                  LR chi2(11)      =        170.63
                                                  Prob > chi2      =         0.0000
Log likelihood = -402.48838                       Pseudo R2       =         0.1749
```

sexact1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Iagecat_2	1.223094	.4103673	0.60	0.548	.6336772	2.360757
_Iagecat_3	4.903354	2.086431	3.74	0.000	2.129598	11.28987
_Iagecat_4	7.256137	2.893247	4.97	0.000	3.321276	15.8528
_Isex1_2	4.566185	1.128916	6.14	0.000	2.812597	7.413093
_Irelcat_2	.7580921	.401776	-0.52	0.601	.268287	2.142123
_Irelcat_3	2.012821	.6143102	2.29	0.022	1.106674	3.660924
_Irelcat_4	4.927222	3.447138	2.28	0.023	1.250525	19.41386
_Irelcat_5	2.031902	1.944895	0.74	0.459	.3112795	13.26341
_Iagesex_2	1.701369	.6998852	1.29	0.196	.7597016	3.810253
_Iagesex_3	1.31033	.5206053	0.68	0.496	.6014386	2.854765
_Iagesex_4	1.985185	.6534489	2.08	0.037	1.041399	3.784293

. est store a

```
. xi: logistic sexact1 i.agecat i.sex1 i.relcacat
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcacat    _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)
```

```
Logistic regression                               Number of obs =          753
                                                  LR chi2(8)       =         165.87
```

```

Log likelihood = -404.86829
Prob > chi2 = 0.0000
Pseudo R2 = 0.1700

```

sexacti1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Iagecat_2	1.62703	.4771692	1.66	0.097	.9157111	2.890898
_Iagecat_3	3.994963	1.211489	4.57	0.000	2.204866	7.238411
_Iagecat_4	7.588623	2.467837	6.23	0.000	4.011903	14.35409
_Isex1_2	4.103635	.7126178	8.13	0.000	2.9198	5.767456
_Irelcat_2	.7776651	.4112729	-0.48	0.634	.2758224	2.192581
_Irelcat_3	2.073982	.6256851	2.42	0.016	1.148185	3.746261
_Irelcat_4	5.133641	3.60194	2.33	0.020	1.297756	20.30757
_Irelcat_5	2.197681	2.120544	0.82	0.414	.3316192	14.5643

```
. est store b
```

```
. lrtest a b
```

```

Likelihood-ratio test
(Assumption: b nested in a)
LR chi2(3) = 4.76
Prob > chi2 = 0.1903

```

```

. xi: logistic sexacti1 i.agecat i.sex1 i.relcata i.agerel
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcata     _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)
i.agerel      _Iagerel_1-20     (naturally coded; _Iagerel_1 omitted)

```

```

note: _Iagerel_10 != 0 predicts failure perfectly
      _Iagerel_10 dropped and 1 obs not used

```

```

note: _Iagerel_16 != 0 predicts success perfectly
      _Iagerel_16 dropped and 5 obs not used

```

```

note: _Iagerel_20 != 0 predicts success perfectly
      _Iagerel_20 dropped and 2 obs not used

```

```

note: _Iagerel_5 dropped because of collinearity
note: _Iagerel_8 dropped because of collinearity
note: _Iagerel_9 dropped because of collinearity
note: _Iagerel_15 dropped because of collinearity

```

```

Logistic regression
Log likelihood = -398.87506
Number of obs = 745
LR chi2(13) = 162.22
Prob > chi2 = 0.0000
Pseudo R2 = 0.1690

```

sexacti1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
_Iagecat_2	.8448213	.685611	-0.21	0.835	.1721774	4.145278
_Iagecat_3	4.4196	2.187365	3.00	0.003	1.675341	11.65904
_Iagecat_4	.8617751	.953143	-0.13	0.893	.0986156	7.530821
_Isex1_2	4.113347	.7247712	8.03	0.000	2.91215	5.810011
_Irelcat_2	.2918458	.2455608	-1.46	0.143	.056098	1.518307
_Irelcat_3	2.685199	1.332153	1.99	0.046	1.015517	7.100121
_Irelcat_4	1.884687	2.075061	0.58	0.565	.2177996	16.30878
_Irelcat_5	2.421148	3.633841	0.59	0.556	.1277832	45.87422
_Iagerel_2	1.985718	1.665292	0.82	0.413	.3837695	10.27459
_Iagerel_3	.9108031	.4548533	-0.19	0.852	.3422442	2.42389

_Iagerel_4		10.14612	11.0982	2.12	0.034	1.189118	86.57158
_Iagerel_6		1.93315	1.534391	0.83	0.406	.4079858	9.159801
_Iagerel_12		3.858027	4.486012	1.16	0.246	.3950121	37.68079

. est store a

```
. xi: logistic sexactil i.agecat i.sex1 i.relcats
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcats     _Irelcats_1-5     (naturally coded; _Irelcats_1 omitted)
```

```
Logistic regression                Number of obs   =      753
                                   LR chi2(8)         =     165.87
                                   Prob > chi2        =      0.0000
Log likelihood = -404.86829         Pseudo R2      =      0.1700
```

sexactil		Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2		1.62703	.4771692	1.66	0.097	.9157111 2.890898
_Iagecat_3		3.994963	1.211489	4.57	0.000	2.204866 7.238411
_Iagecat_4		7.588623	2.467837	6.23	0.000	4.011903 14.35409
_Isex1_2		4.103635	.7126178	8.13	0.000	2.9198 5.767456
_Irelcats_2		.7776651	.4112729	-0.48	0.634	.2758224 2.192581
_Irelcats_3		2.073982	.6256851	2.42	0.016	1.148185 3.746261
_Irelcats_4		5.133641	3.60194	2.33	0.020	1.297756 20.30757
_Irelcats_5		2.197681	2.120544	0.82	0.414	.3316192 14.5643

. est store b

```
. lrtest a b
observations differ: 745 vs. 753
r(498);
```

```
. xi: logistic sexactil i.agecat i.sex1 i.relcats i.sexrel
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcats     _Irelcats_1-5     (naturally coded; _Irelcats_1 omitted)
i.sexrel      _Isexrel_1-10     (naturally coded; _Isexrel_1 omitted)
```

```
note: _Isexrel_5 dropped because of collinearity
note: _Isexrel_6 dropped because of collinearity
note: _Isexrel_8 dropped because of collinearity
```

```
Logistic regression                Number of obs   =      753
                                   LR chi2(12)        =     169.93
                                   Prob > chi2        =      0.0000
Log likelihood = -402.83992         Pseudo R2      =      0.1742
```

sexactil		Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
_Iagecat_2		1.679459	.4938163	1.76	0.078	.9438173 2.988482
_Iagecat_3		3.955172	1.202186	4.52	0.000	2.179918 7.176136
_Iagecat_4		7.675963	2.502138	6.25	0.000	4.05197 14.54118
_Isex1_2		2.124181	1.258977	1.27	0.204	.6648054 6.787168
_Irelcats_2		.7506309	.5429146	-0.40	0.692	.1818743 3.098001
_Irelcats_3		3.059847	2.277603	1.50	0.133	.7113877 13.16113
_Irelcats_4		7.707572	5.924218	2.66	0.008	1.708694 34.76729
_Irelcats_5		4.577257	5.710958	1.22	0.223	.3968047 52.79997

```

_Isexrel_2 | 2.19566 1.322631 1.31 0.192 .6742401 7.150156
_Isexrel_3 | .89907 .739607 -0.13 0.897 .1792936 4.508398
_Isexrel_4 | 1.229441 1.26429 0.20 0.841 .1638242 9.226503
_Isexrel_10 | .317839 .6510047 -0.56 0.576 .005738 17.60583
-----

```

```
. est store a
```

```
. xi: logistic sexactil i.agecat i.sex1 i.relcats
i.agecat      _Iagecat_1-4      (naturally coded; _Iagecat_1 omitted)
i.sex1        _Isex1_1-2        (naturally coded; _Isex1_1 omitted)
i.relcats     _Irelcat_1-5      (naturally coded; _Irelcat_1 omitted)

```

```

Logistic regression                               Number of obs   =       753
                                                  LR chi2(8)      =      165.87
                                                  Prob > chi2     =       0.0000
Log likelihood = -404.86829                      Pseudo R2      =       0.1700

```

```

-----
sexactil | Odds Ratio   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
_Iagecat_2 | 1.62703   .4771692     1.66  0.097     .9157111   2.890898
_Iagecat_3 | 3.994963  1.211489     4.57  0.000     2.204866   7.238411
_Iagecat_4 | 7.588623  2.467837     6.23  0.000     4.011903  14.35409
_Isex1_2   | 4.103635  .7126178     8.13  0.000     2.9198     5.767456
_Irelcat_2 | .7776651  .4112729    -0.48  0.634     .2758224   2.192581
_Irelcat_3 | 2.073982  .6256851     2.42  0.016     1.148185   3.746261
_Irelcat_4 | 5.133641  3.60194     2.33  0.020     1.297756  20.30757
_Irelcat_5 | 2.197681  2.120544     0.82  0.414     .3316192  14.5643
-----

```

```
. est store b
```

```
. lrtest a b
```

```

Likelihood-ratio test                               LR chi2(4) =       4.06
(Assumption: b nested in a)                       Prob > chi2 =      0.3984

```

Appendix I2. Formulation of Final Models for Behaviour Change

For ever had sex:

This is the original model for eversex (Table 18 in thesis)

```

. xi:glm eversex i.contint1 i.time timegroup1, robust cluster(number)
family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)

```

```

Iteration 0:  log pseudolikelihood = -2190.5644
Iteration 1:  log pseudolikelihood = -1590.0694
Iteration 2:  log pseudolikelihood = -1589.8877
Iteration 3:  log pseudolikelihood = -1589.8876

```

```

Generalized linear models                               No. of obs   =
2435
Optimization      : ML                               Residual df   =
2429

```



```

1
Deviance = 3179.7752 (1/df) Deviance =
1.309088
Pearson = 2434.997304 (1/df) Pearson =
1.002469

Variance function: V(u) = u*(1-u/1) [Binomial]
Link function : g(u) = ln(u) [Log]

1.310791
Log pseudolikelihood = -1589.8876 AIC =
15760.84 BIC = -

```

(Std. Err. adjusted for 802 clusters in number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	.9499958	.1211534	-0.40	0.688	.7398907
_Itime_2	1.059662	.0389664	1.58	0.115	.9859761
_Itime_3	1.056244	.0736378	0.78	0.433	.9213427
_Itime_4	1.041868	.0967211	0.44	0.659	.8685445
timegroup1	.9973209	.0380718	-0.07	0.944	.9254246

I added age but it brought the subject numbers down since some ages were missing, and it produced a model that did not converge.

```

. xi:glm eversex i.contint1 i.time timegroup1 age, robust cluster(number)
family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)

```

```

Iteration 0: log pseudolikelihood = -2427.9112
Iteration 1: log pseudolikelihood = -1464.9515
Iteration 2: log pseudolikelihood = -1456.4221
Iteration 3: log pseudolikelihood = -1455.6765
Iteration 4: log pseudolikelihood = -1455.6475
Iteration 5: log pseudolikelihood = -1455.6475

```

```

Generalized linear models          No. of obs =
2352
Optimization      : ML              Residual df =
2345
Scale parameter =
1

```

```

Deviance          = 2911.294986          (1/df) Deviance =
1.24149
Pearson           = 2305.094848          (1/df) Pearson  =
.9829829

Variance function: V(u) = u*(1-u/1)      [Binomial]
Link function     : g(u) = ln(u)         [Log]

AIC =
1.243748
Log pseudolikelihood = -1455.647493     BIC = -
15292.99

```

(Std. Err. adjusted for 757 clusters in number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	1.039338	.1190593	0.34	0.736	.8303271
1.300962					
_Itime_2	1.048551	.0308822	1.61	0.107	.9897369
1.11086					
_Itime_3	1.063851	.0626381	1.05	0.293	.9479011
1.193983					
_Itime_4	1.052851	.0875283	0.62	0.536	.8945461
1.239171					
timegroup1	.9904422	.031447	-0.30	0.762	.9306857
1.054035					
age	1.238895	.0218912	12.12	0.000	1.196723
1.282552					

Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

This is what the above warning means according to Stata's help function:

"My glm output reports that some mean estimates are inadmissible

Your estimation results show that your parameter estimates produce inadmissible mean predictions for one or more observations in your estimation sample. As a result, you should exercise caution in interpreting these parameter estimates.

If you obtained this warning, then you have attempted to fit a binomial model with either log or identity link.

If you fit a binomial model with log link either via glm or binreg with option rr for risk ratios, then the warning arose because the linear predictor (eta in glm jargon) is greater than zero for one or more observations. For this model, the estimated probability of a positive event is the exponentiated linear predictor. When the linear predictor is greater than zero, the estimated probability is greater than one, which is inadmissible.

If you fit a binomial model with identity link either via glm or binreg with option rd for risk differences, then the warning arose because the linear predictor is outside the range [0,1] for one or more observations. As such, the predicted probability of a positive event (which is just the linear predictor in this case) is outside its admissible range for these observations.

Most likely your model was fit via ML and the estimation algorithm did not converge. Even if the algorithm did converge, the interpretation of the resulting parameter estimates is questionable."

Then I recoded to age group (age1) and used code 99 for missing age.

```
. gen age1 = age
(83 missing values generated)
```

```
. recode age1 .=99
(age1: 83 changes made)
```

```
. tab age1
```

age1	Freq.	Percent	Cum.
14	401	16.44	16.44
15	1,035	42.44	58.88
16	558	22.88	81.75
17	239	9.80	91.55
18	92	3.77	95.33
19	25	1.03	96.35
20	6	0.25	96.60
99	83	3.40	100.00
Total	2,439	100.00	

Using age1 instead of age

```
. xi:glm eversex i.contint1 i.time timegroup1 i.age1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.age1         _Iage1_14-99        (naturally coded; _Iage1_14 omitted)
```

```
Iteration 0:  log pseudolikelihood = -2065.4075 (not concave)
Iteration 1:  log pseudolikelihood = -1588.0698 (not concave)
Iteration 2:  log pseudolikelihood = -1573.8717 (not concave)
Iteration 3:  log pseudolikelihood = -1573.1617 (not concave)
Iteration 4:  log pseudolikelihood = -1573.1364 (not concave)
Iteration 5:  log pseudolikelihood = -1573.1343 (not concave)
Iteration 6:  log pseudolikelihood = -1573.1342 (not concave)
Iteration 7:  log pseudolikelihood = -1573.1342 (not concave)
Iteration 8:  log pseudolikelihood = -1573.1342 (not concave)
Iteration 9:  log pseudolikelihood = -1573.1342 (not concave)
Iteration 10: log pseudolikelihood = -1573.1342 (not concave)
```

```

Iteration 11: log pseudolikelihood = -1573.1342 (not concave)
Iteration 12: log pseudolikelihood = -1573.1342 (not concave)
Iteration 13: log pseudolikelihood = -1573.1342 (not concave)
Iteration 14: log pseudolikelihood = -1573.1342 (not concave)
Iteration 15: log pseudolikelihood = -1573.1341 (not concave)
Iteration 16: log pseudolikelihood = -1573.1341 (not concave)
Iteration 17: log pseudolikelihood = -1573.1341 (not concave)
Iteration 18: log pseudolikelihood = -1573.1341 (not concave)
Iteration 19: log pseudolikelihood = -1573.1341 (not concave)
Iteration 20: log pseudolikelihood = -1573.1341 (not concave)
Iteration 21: log pseudolikelihood = -1573.1341 (not concave)
Iteration 22: log pseudolikelihood = -1573.1341 (not concave)
Iteration 23: log pseudolikelihood = -1573.1341 (not concave)
Iteration 24: log pseudolikelihood = -1573.1341 (not concave)
Iteration 25: log pseudolikelihood = -1573.1341 (not concave)
Iteration 26: log pseudolikelihood = -1573.1341 (not concave)
Iteration 27: log pseudolikelihood = -1573.1341 (not concave)
Iteration 28: log pseudolikelihood = -1573.1341 (not concave)
Iteration 29: log pseudolikelihood = -1573.1341 (not concave)
Iteration 30: log pseudolikelihood = -1573.1341 (not concave)
Iteration 31: log pseudolikelihood = -1573.134 (not concave)
Iteration 32: log pseudolikelihood = -1573.134 (not concave)
Iteration 33: log pseudolikelihood = -1573.134 (not concave)
Iteration 34: log pseudolikelihood = -1573.134 (not concave)
Iteration 35: log pseudolikelihood = -1573.134 (not concave)
Iteration 36: log pseudolikelihood = -1573.134 (not concave)
Iteration 37: log pseudolikelihood = -1573.134 (not concave)
Iteration 38: log pseudolikelihood = -1573.134 (not concave)
Iteration 39: log pseudolikelihood = -1573.134 (not concave)
Iteration 40: log pseudolikelihood = -1573.134 (not concave)
Iteration 41: log pseudolikelihood = -1573.134 (not concave)
Iteration 42: log pseudolikelihood = -1573.134 (not concave)
Iteration 43: log pseudolikelihood = -1573.134 (not concave)
Iteration 44: log pseudolikelihood = -1573.134 (not concave)
Iteration 45: log pseudolikelihood = -1573.134 (not concave)
Iteration 46: log pseudolikelihood = -1573.134 (not concave)
Iteration 47: log pseudolikelihood = -1573.1339 (not concave)
Iteration 48: log pseudolikelihood = -1573.1339 (not concave)
--Break--
r(1) ;

```

. The model did not work

So abandoned age and went to sex

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family(binomial) link(log) eform
i.contint1 _Icontint1_0-1 (naturally coded; _Icontint1_0
omitted)
i.time _itime_1-4 (naturally coded; _itime_1 omitted)
i.sex1 _Isex1_1-99 (naturally coded; _Isex1_1 omitted)

Iteration 0: log pseudolikelihood = -1998.9875
Iteration 1: log pseudolikelihood = -1459.7919
Iteration 2: log pseudolikelihood = -1447.1457
Iteration 3: log pseudolikelihood = -1446.7765
Iteration 4: log pseudolikelihood = -1446.7761

```

Iteration 5: log pseudolikelihood = -1446.7761

```

Generalized linear models                No. of obs    =
2435                                     Residual df    =
Optimization      : ML                   Scale parameter =
2427                                                     (1/df) Deviance =
1                                                     (1/df) Pearson  =
Deviance          = 2893.552205
1.192234
Pearson          = 2442.460065
1.00637

Variance function: V(u) = u*(1-u/1)      [Binomial]
Link function     : g(u) = ln(u)         [Log]

1.194888                                     AIC            =
Log pseudolikelihood = -1446.776102      BIC            = -
16031.47

```

(Std. Err. adjusted for 802 clusters in number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	.8894992	.1020005	-1.02	0.307	.7104552
1.113665					
_Itime_2	1.067882	.0350639	2.00	0.045	1.001323
1.138865					
_Itime_3	1.090044	.0659772	1.42	0.154	.9681068
1.22734					
_Itime_4	1.087968	.0887471	1.03	0.301	.9272191
1.276585					
timegroup1	.9921165	.0330752	-0.24	0.812	.9293629
1.059107					
_Isex1_2	2.540017	.2441537	9.70	0.000	2.103859
3.066596					
_Isex1_99	1.617395	.3825635	2.03	0.042	1.017375
2.571292					

. sex is significant (higher risk for males) but it does not change the effect of the intervention

Tried again to put age in and it did not work

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1 i.age1, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age1         _Iage1_14-99        (naturally coded; _Iage1_14 omitted)

```

note: _Iage1_99 dropped because of collinearity

```
Iteration 0: log pseudolikelihood = -2726.1961 (not concave)
Iteration 1: log pseudolikelihood = -2529.5721 (not concave)
Iteration 2: log pseudolikelihood = -2528.5554 (not concave)
Iteration 3: log pseudolikelihood = -2528.4001 (not concave)
Iteration 4: log pseudolikelihood = -2528.3987 (not concave)
Iteration 5: log pseudolikelihood = -2528.3985 (not concave)
Iteration 6: log pseudolikelihood = -2528.3984 (not concave)
Iteration 7: log pseudolikelihood = -2528.3983 (not concave)
Iteration 8: log pseudolikelihood = -2528.398 (not concave)
Iteration 9: log pseudolikelihood = -2528.3975 (not concave)
Iteration 10: log pseudolikelihood = -2528.3974 (not concave)
Iteration 11: log pseudolikelihood = -2528.3974 (not concave)
Iteration 12: log pseudolikelihood = -2528.3966 (not concave)
Iteration 13: log pseudolikelihood = -2528.3958 (not concave)
Iteration 14: log pseudolikelihood = -2528.3957 (not concave)
Iteration 15: log pseudolikelihood = -2528.3957 (not concave)
Iteration 16: log pseudolikelihood = -2528.395 (not concave)
Iteration 17: log pseudolikelihood = -2528.3942 (not concave)
Iteration 18: log pseudolikelihood = -2528.3941 (not concave)
Iteration 19: log pseudolikelihood = -2528.3931 (not concave)
Iteration 20: log pseudolikelihood = -2528.3926 (not concave)
Iteration 21: log pseudolikelihood = -2528.3924 (not concave)
Iteration 22: log pseudolikelihood = -2528.3921 (not concave)
Iteration 23: log pseudolikelihood = -2528.392 (not concave)
--Break--
r(1);
```

```
. xi:glm eversex i.contint1 i.time timegroup1 i.sex1 age, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
note: _Isex1_99 dropped because of collinearity
```

```
Iteration 0: log pseudolikelihood = -2486.9277
Iteration 1: log pseudolikelihood = -1365.6487
Iteration 2: log pseudolikelihood = -1339.9511
Iteration 3: log pseudolikelihood = -1331.3224
Iteration 4: log pseudolikelihood = -1330.0786
Iteration 5: log pseudolikelihood = -1329.968
Iteration 6: log pseudolikelihood = -1329.9607
Iteration 7: log pseudolikelihood = -1329.9606
Iteration 8: log pseudolikelihood = -1329.9606 (backed up)
Iteration 9: log pseudolikelihood = -1329.9606 (backed up)
Iteration 10: log pseudolikelihood = -1329.9606 (backed up)
Iteration 11: log pseudolikelihood = -1329.9606 (backed up)
Iteration 12: log pseudolikelihood = -1329.9606 (backed up)
Iteration 13: log pseudolikelihood = -1329.9606 (backed up)
Iteration 14: log pseudolikelihood = -1329.9606 (backed up)
Iteration 15: log pseudolikelihood = -1329.9606 (backed up)
Iteration 16: log pseudolikelihood = -1329.9606 (backed up)
Iteration 17: log pseudolikelihood = -1329.9606 (backed up)
--Break--
r(1);
```

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1 i.age, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age           _Iage_14-20         (naturally coded; _Iage_14 omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0:  log pseudolikelihood = -2655.3177 (not concave)
Iteration 1:  log pseudolikelihood = -2479.3805 (not concave)
Iteration 2:  log pseudolikelihood = -2477.7816 (not concave)
Iteration 3:  log pseudolikelihood = -2477.6157 (not concave)
Iteration 4:  log pseudolikelihood = -2477.6023 (not concave)
Iteration 5:  log pseudolikelihood = -2477.6008 (not concave)
Iteration 6:  log pseudolikelihood = -2477.6007 (not concave)
Iteration 7:  log pseudolikelihood = -2477.6006 (not concave)
Iteration 8:  log pseudolikelihood = -2477.5997 (not concave)
Iteration 9:  log pseudolikelihood = -2477.5989 (not concave)
Iteration 10: log pseudolikelihood = -2477.5985 (not concave)
Iteration 11: log pseudolikelihood = -2477.5982 (not concave)
Iteration 12: log pseudolikelihood = -2477.598 (not concave)
Iteration 13: log pseudolikelihood = -2477.5979 (not concave)
Iteration 14: log pseudolikelihood = -2477.5974 (not concave)
Iteration 15: log pseudolikelihood = -2477.597 (not concave)
Iteration 16: log pseudolikelihood = -2477.5968 (not concave)
Iteration 17: log pseudolikelihood = -2477.5967 (not concave)
Iteration 18: log pseudolikelihood = -2477.5962 (not concave)

```

```
--Break--
```

```
r(1);
```

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1 age, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0:  log pseudolikelihood = -2486.9277
Iteration 1:  log pseudolikelihood = -1365.6487
Iteration 2:  log pseudolikelihood = -1339.9511
Iteration 3:  log pseudolikelihood = -1331.3224
Iteration 4:  log pseudolikelihood = -1330.0786
Iteration 5:  log pseudolikelihood = -1329.968
Iteration 6:  log pseudolikelihood = -1329.9607
Iteration 7:  log pseudolikelihood = -1329.9606
Iteration 8:  log pseudolikelihood = -1329.9606 (backed up)
Iteration 9:  log pseudolikelihood = -1329.9606 (backed up)
Iteration 10: log pseudolikelihood = -1329.9606 (backed up)
Iteration 11: log pseudolikelihood = -1329.9606 (backed up)
Iteration 12: log pseudolikelihood = -1329.9606 (backed up)
Iteration 13: log pseudolikelihood = -1329.9606 (backed up)
Iteration 14: log pseudolikelihood = -1329.9606 (backed up)
Iteration 15: log pseudolikelihood = -1329.9606 (backed up)

```



```

Iteration 16: log pseudolikelihood = -1329.9606 (backed up)
Iteration 17: log pseudolikelihood = -1329.9606 (backed up)
Iteration 18: log pseudolikelihood = -1329.9606 (backed up)
Iteration 19: log pseudolikelihood = -1329.9606 (backed up)
Iteration 20: log pseudolikelihood = -1329.9606 (backed up)
Iteration 21: log pseudolikelihood = -1329.9606 (backed up)
Iteration 22: log pseudolikelihood = -1329.9606 (backed up)
--Break--
r(1);

```

Tried to put religion in and it did not work

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1 i.relcats, robust
cluster(number) family(binomial) link(log) eform
i.contint1 _Icontint1_0-1 (naturally coded; _Icontint1_0
omitted)
i.time _itime_1-4 (naturally coded; _itime_1 omitted)
i.sex1 _Isex1_1-99 (naturally coded; _Isex1_1 omitted)
i.relcats _Irelcats_1-4 (naturally coded; _Irelcats_1 omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0: log pseudolikelihood = -2318.6675 (not concave)
Iteration 1: log pseudolikelihood = -2308.3674 (not concave)
Iteration 2: log pseudolikelihood = -2308.3636 (not concave)
Iteration 3: log pseudolikelihood = -2308.3635 (not concave)
Iteration 4: log pseudolikelihood = -2308.3424 (not concave)
Iteration 5: log pseudolikelihood = -2308.3122 (not concave)
Iteration 6: log pseudolikelihood = -2308.3093 (not concave)
Iteration 7: log pseudolikelihood = -2308.309 (not concave)
Iteration 8: log pseudolikelihood = -2308.3086 (not concave)
Iteration 9: log pseudolikelihood = -2308.3086 (not concave)
Iteration 10: log pseudolikelihood = -2308.3085 (not concave)
Iteration 11: log pseudolikelihood = -2308.3084 (not concave)
Iteration 12: log pseudolikelihood = -2308.3065 (not concave)
Iteration 13: log pseudolikelihood = -2308.305 (not concave)
Iteration 14: log pseudolikelihood = -2308.3049 (not concave)
Iteration 15: log pseudolikelihood = -2308.3046 (not concave)
Iteration 16: log pseudolikelihood = -2308.3042 (not concave)
Iteration 17: log pseudolikelihood = -2308.3037 (not concave)
Iteration 18: log pseudolikelihood = -2308.3037 (not concave)
Iteration 19: log pseudolikelihood = -2308.3036 (not concave)
Iteration 20: log pseudolikelihood = -2308.3036 (not concave)
Iteration 21: log pseudolikelihood = -2308.3035 (not concave)
Iteration 22: log pseudolikelihood = -2308.3035 (not concave)
Iteration 23: log pseudolikelihood = -2308.3034 (not concave)
Iteration 24: log pseudolikelihood = -2308.3034 (not concave)
Iteration 25: log pseudolikelihood = -2308.3033 (not concave)
Iteration 26: log pseudolikelihood = -2308.3019 (not concave)
Iteration 27: log pseudolikelihood = -2308.3001 (not concave)
Iteration 28: log pseudolikelihood = -2308.2998 (not concave)
Iteration 29: log pseudolikelihood = -2308.2995 (not concave)
--Break--
r(1);

```

Using religion without sex, the model did not converge.


```
. xi:glm eversex i.contint1 i.time timegroup1 i.relcats, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.relcats       _Irelcats_1-4       (naturally coded; _Irelcats_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -2064.7353
Iteration 1:  log pseudolikelihood = -1501.9398
Iteration 2:  log pseudolikelihood = -1497.0154
Iteration 3:  log pseudolikelihood = -1494.0974
Iteration 4:  log pseudolikelihood = -1492.0208
Iteration 5:  log pseudolikelihood = -1491.812
Iteration 6:  log pseudolikelihood = -1491.8097
Iteration 7:  log pseudolikelihood = -1491.8097
```

```
Generalized linear models                               No. of obs      =
2335                                                    Residual df    =
Optimization      : ML                                Scale parameter =
2326                                                    (1/df) Deviance =
1                                                       (1/df) Pearson =
Deviance          = 2983.619461
1.282725
Pearson          = 2334.927613
1.003838

Variance function: V(u) = u*(1-u/1)                  [Binomial]
Link function     : g(u) = ln(u)                     [Log]

1.28549
Log pseudolikelihood = -1491.809731                 AIC            =
15056.29                                             BIC            = -
```

(Std. Err. adjusted for 751 clusters in number)

eversex	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	.9957611	.1255832	-0.03	0.973	.7776845
_Itime_2	1.04431	.0356224	1.27	0.204	.976774
_Itime_3	1.033023	.0717183	0.47	0.640	.9016017
_Itime_4	1.026934	.0921429	0.30	0.767	.8613254
timegroup1	1.01112	.0382346	0.29	0.770	.938891
_Irelcats_2	.964147	.2964436	-0.12	0.905	.5277482
_Irelcats_3	1.662688	.2195018	3.85	0.000	1.283625

```

    _Irelcat_4 | 2.330751 .3602214 5.48 0.000 1.721636
3.155371

```

Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

Tried race instead of religion and the model still did not converge.

```

. xi:glm eversex i.contint1 i.time timegroup1 i.racecat, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.racecat       _Iracecat_1-4       (naturally coded; _Iracecat_1
omitted)

```

```

Iteration 0:  log pseudolikelihood = -2104.2077
Iteration 1:  log pseudolikelihood = -1527.7911
Iteration 2:  log pseudolikelihood = -1526.8264
Iteration 3:  log pseudolikelihood = -1526.7693
Iteration 4:  log pseudolikelihood = -1526.7692

```

```

Generalized linear models              No. of obs      =
2350
Optimization      : ML                 Residual df      =
2341
                                           Scale parameter =
1
Deviance          = 3053.538402         (1/df) Deviance =
1.304374
Pearson           = 2350.148045         (1/df) Pearson   =
1.003908

Variance function: V(u) = u*(1-u/1)    [Binomial]
Link function     : g(u) = ln(u)       [Log]

                                           AIC              =
1.307038
Log pseudolikelihood = -1526.769201    BIC              = -
15117.7

```

(Std. Err. adjusted for 756 clusters in number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	.9549465	.1372372	-0.32	0.748	.7205286
1.26563					
_Itime_2	1.064904	.0381349	1.76	0.079	.9927238
1.142332					
_Itime_3	1.070367	.0742126	0.98	0.327	.9343633
1.226167					
_Itime_4	1.036999	.0969124	0.39	0.697	.8634343
1.245452					

```

    timegroup1 | .9943252 .0377188 -0.15 0.881 .9230791
1.07107
    _Iracecat_2 | .5810101 .2768567 -1.14 0.254 .228338
1.47839
    _Iracecat_3 | 1.00157 .1150216 0.01 0.989 .7997019
1.254395
    _Iracecat_4 | 1.927855 .471243 2.69 0.007 1.194008
3.112728

```

Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1 i.racecat, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.racecat       _Iracecat_1-4       (naturally coded; _Iracecat_1
omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0:  log pseudolikelihood = -1985.8702 (not concave)
Iteration 1:  log pseudolikelihood = -1776.7147 (not concave)
Iteration 2:  log pseudolikelihood = -1772.0987 (not concave)
Iteration 3:  log pseudolikelihood = -1772.0535 (not concave)
Iteration 4:  log pseudolikelihood = -1772.0522 (not concave)
Iteration 5:  log pseudolikelihood = -1772.0522 (not concave)
Iteration 6:  log pseudolikelihood = -1772.0522 (not concave)
Iteration 7:  log pseudolikelihood = -1772.0521 (not concave)
Iteration 8:  log pseudolikelihood = -1772.0521 (not concave)
Iteration 9:  log pseudolikelihood = -1772.0521 (not concave)
Iteration 10: log pseudolikelihood = -1772.052 (not concave)
Iteration 11: log pseudolikelihood = -1772.0513 (not concave)
Iteration 12: log pseudolikelihood = -1772.0507 (not concave)
Iteration 13: log pseudolikelihood = -1772.0507 (not concave)
Iteration 14: log pseudolikelihood = -1772.0506 (not concave)
--Break--
r(1);

```

Decided to go with this as the final model:

```

. xi:glm eversex i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)

Iteration 0:  log pseudolikelihood = -1998.9875
Iteration 1:  log pseudolikelihood = -1459.7919
Iteration 2:  log pseudolikelihood = -1447.1457
Iteration 3:  log pseudolikelihood = -1446.7765
Iteration 4:  log pseudolikelihood = -1446.7761
Iteration 5:  log pseudolikelihood = -1446.7761

```

Generalized linear models
 2435
 Optimization : ML
 2427

No. of obs =
 Residual df =
 Scale parameter =
 (1/df) Deviance =
 (1/df) Pearson =

1
 Deviance = 2893.552205
 1.192234
 Pearson = 2442.460065
 1.00637

Variance function: $V(u) = u*(1-u/1)$ [Binomial]
 Link function : $g(u) = \ln(u)$ [Log]

1.194888
 Log pseudolikelihood = -1446.776102
 16031.47

AIC =
 BIC = -

(Std. Err. adjusted for 802 clusters in

number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	.8894992	.1020005	-1.02	0.307	.7104552
1.113665					
_Itime_2	1.067882	.0350639	2.00	0.045	1.001323
1.138865					
_Itime_3	1.090044	.0659772	1.42	0.154	.9681068
1.22734					
_Itime_4	1.087968	.0887471	1.03	0.301	.9272191
1.276585					
timegroup1	.9921165	.0330752	-0.24	0.812	.9293629
1.059107					
_Isex1_2	2.540017	.2441537	9.70	0.000	2.103859
3.066596					
_Isex1_99	1.617395	.3825635	2.03	0.042	1.017375
2.571292					

Alcohol at last sex:

```
. xi:glm alcsex i.contint1 i.time timegroup1, robust cluster(number)
family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -557.44133
Iteration 1:  log pseudolikelihood = -407.28228
Iteration 2:  log pseudolikelihood = -405.08263
Iteration 3:  log pseudolikelihood = -404.99656
Iteration 4:  log pseudolikelihood = -404.99646
Iteration 5:  log pseudolikelihood = -404.99646
```

```
Generalized linear models                No. of obs      =
781                                       Residual df     =
Optimization      : ML                    Scale parameter =
775                                                    (1/df) Deviance =
1                                                    (1/df) Pearson  =
Deviance          = 809.9929204
1.045152
Pearson           = 780.8327867
1.007526

Variance function: V(u) = u*(1-u/1)      [Binomial]
Link function     : g(u) = ln(u)         [Log]

AIC =
1.052488
Log pseudolikelihood = -404.9964602     BIC = -
4351.953
```

(Std. Err. adjusted for 424 clusters in number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	2.472629	.8902734	2.51	0.012	1.220907
_Itime_2	1.13761	.1875481	0.78	0.434	.8234988
_Itime_3	.7896173	.2381314	-0.78	0.433	.4372328
_Itime_4	1.603836	.5116869	1.48	0.139	.8582094
timegroup1	.7272248	.1001637	-2.31	0.021	.5551739

Adding sex

```
. xi:glm alcsex i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99        (naturally coded; _Isex1_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -546.75759
Iteration 1:  log pseudolikelihood = -398.96431
Iteration 2:  log pseudolikelihood = -396.27121
Iteration 3:  log pseudolikelihood = -396.14254
Iteration 4:  log pseudolikelihood = -396.14233
Iteration 5:  log pseudolikelihood = -396.14233
```

```
Generalized linear models                                No. of obs      =
781
Optimization      : ML                                Residual df    =
773
                                                         Scale parameter =
1
Deviance          = 792.2846648                       (1/df) Deviance =
1.024948
Pearson          = 780.2855585                         (1/df) Pearson =
1.009425
```

```
Variance function: V(u) = u*(1-u/1)                   [Binomial]
Link function      : g(u) = ln(u)                     [Log]
                                                         AIC            =
1.034936
Log pseudolikelihood = -396.1423324                   BIC            = -
4356.34
```

(Std. Err. adjusted for 424 clusters in number)

alcsex	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	2.576382	.9298605	2.62	0.009	1.26998
5.226651					
_Itime_2	1.124454	.1852642	0.71	0.477	.8141388
1.553049					
_Itime_3	.8458051	.262628	-0.54	0.590	.4602213
1.55444					
_Itime_4	1.740637	.553939	1.74	0.082	.9328728
3.247835					
timegroup1	.7184522	.0992992	-2.39	0.017	.5479628
.9419866					
_Isex1_2	1.778132	.2976171	3.44	0.001	1.280834
2.46851					
_Isex1_99	2.243349	.7634271	2.37	0.018	1.151402
4.370857					

. Adding age - not signifiacnt

```
. xi:glm alcsex i.contint1 i.time timegroup1 i.sex1 i.age1, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age1         _Iage1_14-99        (naturally coded; _Iage1_14 omitted)
note: _Iage1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -547.92266
Iteration 1:  log pseudolikelihood = -399.0234
Iteration 2:  log pseudolikelihood = -394.09167
Iteration 3:  log pseudolikelihood = -393.7144
Iteration 4:  log pseudolikelihood = -393.71192
Iteration 5:  log pseudolikelihood = -393.71136
Iteration 6:  log pseudolikelihood = -393.71122
Iteration 7:  log pseudolikelihood = -393.71119
```

```
Generalized linear models                               No. of obs      =
781
Optimization      : ML                               Residual df    =
767
Scale parameter =
1
Deviance          = 787.4223817                      (1/df) Deviance =
1.026626
Pearson          = 773.9003215                       (1/df) Pearson  =
1.008997
Variance function: V(u) = u*(1-u/1)                  [Binomial]
Link function     : g(u) = ln(u)                    [Log]
AIC =
1.044075
Log pseudolikelihood = -393.7111909                 BIC = -
4321.239
```

(Std. Err. adjusted for 424 clusters in number)

```
-----
```

	alcsex	Risk Ratio	Robust Std. Err.	z	P> z	{95% Conf. Interval}
_Icontint1_1	4.956991	2.444155	.8817818	2.48	0.013	1.205145
_Itime_2	1.536835	1.114663	.1826562	0.66	0.508	.8084629
_Itime_3	1.550334	.8442235	.261804	-0.55	0.585	.4597159
_Itime_4	3.139359	1.677594	.536376	1.62	0.106	.896464
timegroup1	.9678072	.7354856	.1030081	-2.19	0.028	.5589326

```
-----
```

2.507476	_Isex1_2		1.792687	.3069222	3.41	0.001	1.281657
5.164347	_Isex1_99		2.280659	.9510457	1.98	0.048	1.007176
1.611195	_Iage1_15		.9039363	.2665613	-0.34	0.732	.5071396
1.74734	_Iage1_16		.9774287	.2897054	-0.08	0.939	.5467551
2.301274	_Iage1_17		1.258167	.3876041	0.75	0.456	.6878731
2.394866	_Iage1_18		1.227342	.4186041	0.60	0.548	.6289993
2.292253	_Iage1_19		.7944954	.429515	-0.43	0.670	.2753723
.0000905	_Iage1_20		.0000177	.0000147	-13.13	0.000	3.45e-06

Adding religion did not work

```
. xi:glm alcsex i.contint1 i.time timegroup1 i.sex1 i.age1 i.relcatt,
robust cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age1          _Iage1_14-99        (naturally coded; _Iage1_14 omitted)
i.relcatt       _Irelcatt_1-4       (naturally coded; _Irelcatt_1 omitted)
note: _Isex1_99 dropped because of collinearity
note: _Iage1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -520.51013 (not concave)
Iteration 1:  log pseudolikelihood = -401.52426 (not concave)
Iteration 2:  log pseudolikelihood = -384.78882 (not concave)
Iteration 3:  log pseudolikelihood = -383.06602 (not concave)
Iteration 4:  log pseudolikelihood = -382.9577 (not concave)
Iteration 5:  log pseudolikelihood = -382.93054 (not concave)
Iteration 6:  log pseudolikelihood = -382.92885 (not concave)
Iteration 7:  log pseudolikelihood = -382.92854 (not concave)
Iteration 8:  log pseudolikelihood = -382.92851 (not concave)
Iteration 9:  log pseudolikelihood = -382.9285 (not concave)
Iteration 10: log pseudolikelihood = -382.9285 (not concave)
Iteration 11: log pseudolikelihood = -382.9285 (not concave)
Iteration 12: log pseudolikelihood = -382.9285 (not concave)
Iteration 13: log pseudolikelihood = -382.9285 (not concave)
Iteration 14: log pseudolikelihood = -382.9285 (not concave)
Iteration 15: log pseudolikelihood = -382.9285 (not concave)
Iteration 16: log pseudolikelihood = -382.9285 (not concave)
Iteration 17: log pseudolikelihood = -382.9285 (not concave)
Iteration 18: log pseudolikelihood = -382.9285 (not concave)
Iteration 19: log pseudolikelihood = -382.9285 (not concave)
```

--Break--

r(1);

```
. xi:glm alcsex i.contint1 i.time timegroup1 i.sex1 i.relcatt, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
```



```

i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.relcatt       _Irelcat_1-4        (naturally coded; _Irelcat_1 omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0:  log pseudolikelihood = -532.71685 (not concave)
Iteration 1:  log pseudolikelihood = -475.20583 (not concave)
Iteration 2:  log pseudolikelihood = -471.00157 (not concave)
Iteration 3:  log pseudolikelihood = -470.60571 (not concave)
Iteration 4:  log pseudolikelihood = -470.57436 (not concave)
Iteration 5:  log pseudolikelihood = -470.57103 (not concave)
Iteration 6:  log pseudolikelihood = -470.57099 (not concave)
Iteration 7:  log pseudolikelihood = -470.57099 (not concave)
Iteration 8:  log pseudolikelihood = -470.57098 (not concave)
Iteration 9:  log pseudolikelihood = -470.57097 (not concave)
Iteration 10: log pseudolikelihood = -470.57096 (not concave)
Iteration 11: log pseudolikelihood = -470.57095 (not concave)
Iteration 12: log pseudolikelihood = -470.57095 (not concave)
Iteration 13: log pseudolikelihood = -470.57093 (not concave)

```

--Break--

```
r(1);
```

Using race instead of religion also did not work

```

. xi:glm alcsex i.contint1 i.time timegroup1 i.sex1 i.age1 i.racecat,
robust cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age1          _Iage1_14-99        (naturally coded; _Iage1_14 omitted)
i.racecat       _Iracecat_1-4       (naturally coded; _Iracecat_1
omitted)
note: _Isex1_99 dropped because of collinearity
note: _Iage1_99 dropped because of collinearity

```

```

Iteration 0:  log pseudolikelihood = -568.91995 (not concave)
Iteration 1:  log pseudolikelihood = -481.77737 (not concave)
Iteration 2:  log pseudolikelihood = -464.10005 (not concave)
Iteration 3:  log pseudolikelihood = -457.56489 (not concave)
Iteration 4:  log pseudolikelihood = -456.57953 (not concave)
Iteration 5:  log pseudolikelihood = -456.52086 (not concave)
Iteration 6:  log pseudolikelihood = -456.51894 (not concave)
Iteration 7:  log pseudolikelihood = -456.51873 (not concave)
Iteration 8:  log pseudolikelihood = -456.5187 (not concave)
Iteration 9:  log pseudolikelihood = -456.51869 (not concave)
Iteration 10: log pseudolikelihood = -456.51869 (not concave)
Iteration 11: log pseudolikelihood = -456.51868 (not concave)
Iteration 12: log pseudolikelihood = -456.51868 (not concave)
Iteration 13: log pseudolikelihood = -456.51863 (not concave)

```

--Break--

```
r(1);
```

Decided to go with this as final model:

```
. xi:glm alcsex i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -546.75759
Iteration 1:  log pseudolikelihood = -398.96431
Iteration 2:  log pseudolikelihood = -396.27121
Iteration 3:  log pseudolikelihood = -396.14254
Iteration 4:  log pseudolikelihood = -396.14233
Iteration 5:  log pseudolikelihood = -396.14233
```

```
Generalized linear models                               No. of obs   =
781
Optimization      : ML                               Residual df   =
773
Scale parameter =
1
Deviance          = 792.2846648                       (1/df) Deviance =
1.024948
Pearson           = 780.2855585                       (1/df) Pearson  =
1.009425
Variance function: V(u) = u*(1-u/1)                  [Binomial]
Link function     : g(u) = ln(u)                     [Log]
AIC =
1.034936
Log pseudolikelihood = -396.1423324                 BIC =
4356.34
```

(Std. Err. adjusted for 424 clusters in number)

	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	2.576382	.9298605	2.62	0.009	1.26998
5.226651					
_Itime_2	1.124454	.1852642	0.71	0.477	.8141388
1.553049					
_Itime_3	.8458051	.262628	-0.54	0.590	.4602213
1.55444					
_Itime_4	1.740637	.553939	1.74	0.082	.9328728
3.247835					
timegroup1	.7184522	.0992992	-2.39	0.017	.5479628
.9419866					
_Isex1_2	1.778132	.2976171	3.44	0.001	1.280834
2.46851					
_Isex1_99	2.243349	.7634271	2.37	0.018	1.151402
4.370857					

Condom use at last sex

This is the original model from table 20

```
. xi:glm condlast i.contint1 i.time timegroup1, robust cluster(number)
family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -599.71359
Iteration 1:  log pseudolikelihood = -421.80611
Iteration 2:  log pseudolikelihood = -418.16951
Iteration 3:  log pseudolikelihood = -418.04005
Iteration 4:  log pseudolikelihood = -418.03982
Iteration 5:  log pseudolikelihood = -418.03982
```

```
Generalized linear models                                No. of obs      =
680
Optimization      : ML                                  Residual df    =
674
                                                         Scale parameter =
1
Deviance          = 836.0796364                        (1/df) Deviance =
1.240474
Pearson          = 680.1822112                          (1/df) Pearson =
1.009172

Variance function: V(u) = u*(1-u/1)                    [Binomial]
Link function     : g(u) = ln(u)                       [Log]

                                                         AIC            =
1.247176
Log pseudolikelihood = -418.0398182                    BIC            = -
3559.811
```

(Std. Err. adjusted for 343 clusters in number)

condlast	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	1.401521	.2234729	2.12	0.034	1.025357
1.915684					
_Itime_2	1.031745	.071759	0.45	0.653	.900265
1.182427					
_Itime_3	1.121098	.1246166	1.03	0.304	.901628
1.39399					
_Itime_4	.985433	.1598933	-0.09	0.928	.7169912
1.35438					
timegroup1	.941781	.0558842	-1.01	0.312	.8383795
1.057936					

Adding sex - not signifiacnt

```
. xi:glm condlast i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -600.83082
Iteration 1:  log pseudolikelihood = -422.88983
Iteration 2:  log pseudolikelihood = -416.63619
Iteration 3:  log pseudolikelihood = -416.1272
Iteration 4:  log pseudolikelihood = -416.12664
Iteration 5:  log pseudolikelihood = -416.12664
```

```
Generalized linear models                               No. of obs      =
680
Optimization      : ML                               Residual df    =
672
Scale parameter =
1
Deviance          = 832.2532789                      (1/df) Deviance =
1.238472
Pearson          = 680.1622114                       (1/df) Pearson =
1.012146

Variance function: V(u) = u*(1-u/1)                  [Binomial]
Link function     : g(u) = ln(u)                     [Log]

AIC =
1.247431
Log pseudolikelihood = -416.1266395                 BIC = -
3550.593
```

(Std. Err. adjusted for 343 clusters in number)

condlast Interval]	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf.
_Icontint1_1 1.895311	1.387079	.2209337	2.05	0.040	1.015131
_Itime_2 1.183375	1.032148	.0720033	0.45	0.650	.9002471
_Itime_3 1.402286	1.125346	.1263242	1.05	0.293	.9030993
_Itime_4 1.351115	.9815029	.1600483	-0.11	0.909	.7130021
timegroup1 1.066091	.9478404	.0568558	-0.89	0.372	.8427064
_Isex1_2 1.269807	1.109441	.0764216	1.51	0.132	.9693287
_Isex1_99 1.471153	1.107799	.1603348	0.71	0.479	.8341885

Adding age did not work

```
. xi:glm condlast i.contint1 i.time timegroup1 i.sex1 i.age1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age1         _Iage1_14-99        (naturally coded; _Iage1_14 omitted)
note: _Iage1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -738.09673 (not concave)
Iteration 1:  log pseudolikelihood = -628.19686 (not concave)
Iteration 2:  log pseudolikelihood = -617.54761 (not concave)
Iteration 3:  log pseudolikelihood = -614.24192 (not concave)
Iteration 4:  log pseudolikelihood = -614.07479 (not concave)
Iteration 5:  log pseudolikelihood = -614.07441 (not concave)
Iteration 6:  log pseudolikelihood = -614.0744 (not concave)
Iteration 7:  log pseudolikelihood = -614.07439 (not concave)
Iteration 8:  log pseudolikelihood = -614.07437 (not concave)
Iteration 9:  log pseudolikelihood = -614.07436 (not concave)
Iteration 10: log pseudolikelihood = -614.07435 (not concave)
Iteration 11: log pseudolikelihood = -614.07434 (not concave)
Iteration 12: log pseudolikelihood = -614.07432 (not concave)
Iteration 13: log pseudolikelihood = -614.0743 (not concave)
Iteration 14: log pseudolikelihood = -614.07429 (not concave)
```

--Break--

r(1);

```
. xi:glm condlast i.contint1 i.time timegroup1 i.sex1 age, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
note: _Isex1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -585.58324
Iteration 1:  log pseudolikelihood = -412.29749
Iteration 2:  log pseudolikelihood = -406.65866
Iteration 3:  log pseudolikelihood = -406.22134
Iteration 4:  log pseudolikelihood = -406.22075
Iteration 5:  log pseudolikelihood = -406.22075
```

Generalized linear models

662

Optimization : ML

654

1

Deviance = 812.4414979

1.242265

Pearson = 662.0787045

1.012353

No. of obs =

Residual df =

Scale parameter =

(1/df) Deviance =

(1/df) Pearson =

Variance function: $V(u) = u*(1-u/1)$

[Binomial]

Link function : $g(u) = \ln(u)$ [Log]
 AIC = 1.251422
 Log pseudolikelihood = -406.2207489 BIC = -3435.462

(Std. Err. adjusted for 328 clusters in number)

condlast Interval)	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1 1.870649	1.373034	.2166507	2.01	0.045	1.007791
_Itime_2 1.175998	1.026456	.0712277	0.38	0.707	.8959293
_Itime_3 1.377094	1.106222	.1236198	0.90	0.366	.8886297
_Itime_4 1.356316	.9913352	.158553	-0.05	0.957	.7245699
timegroup1 1.06971	.9525368	.0563826	-0.82	0.411	.8481983
_Isex1_2 1.270823	1.110052	.0766053	1.51	0.130	.9696194
age 1.043119	.9986265	.0222095	-0.06	0.951	.9560317

Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

Adding religion did not work

```
. xi:glm condlast i.contint1 i.time timegroup1 i.sex1 i.relcats, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99          (naturally coded; _Isex1_1 omitted)
i.relcats      _Irelcats_1-4       (naturally coded; _Irelcats_1 omitted)
note: _Isex1_99 dropped because of collinearity
```

```
Iteration 0: log pseudolikelihood = -575.49828
Iteration 1: log pseudolikelihood = -404.92609
Iteration 2: log pseudolikelihood = -398.31451
Iteration 3: log pseudolikelihood = -397.40713
Iteration 4: log pseudolikelihood = -397.38234
Iteration 5: log pseudolikelihood = -397.38233
```

Generalized linear models No. of obs = 653
 Optimization : ML Residual df = 643
 Scale parameter = 1

```

Deviance          = 794.7646531          (1/df) Deviance =
1.236026
Pearson           = 653.4690518          (1/df) Pearson  =
1.016282

Variance function: V(u) = u*(1-u/1)      [Binomial]
Link function     : g(u) = ln(u)         [Log]

AIC               =
1.247725
Log pseudolikelihood = -397.3823265      BIC               = -
3372.889

```

(Std. Err. adjusted for 324 clusters in number)

condlast Interval]	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf.
_Icontint1_1 1.843198	1.35892	.211338	1.97	0.049	1.00188
_Itime_2 1.178951	1.030524	.0707487	0.44	0.661	.9007832
_Itime_3 1.348765	1.090651	.1182012	0.80	0.423	.8819328
_Itime_4 1.334522	.9828076	.1533987	-0.11	0.912	.7237876
timegroup1 1.071807	.9574866	.0551001	-0.75	0.450	.85536
_Isex1_2 1.280676	1.11673	.078049	1.58	0.114	.9737721
_Irelcat_2 1.459696	1.090653	.1621828	0.58	0.560	.814912
_Irelcat_3 1.360312	1.104297	.1174777	0.93	0.351	.8964642
_Irelcat_4 1.481101	.8284809	.2455676	-0.63	0.526	.4634259

Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

Adding race did not work

```

. xi:glm condlast i.contint1 i.time timegroup1 i.sex1 i.racecat, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.racecat      _Iracecat_1-4      (naturally coded; _Iracecat_1
omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0:  log pseudolikelihood = -595.40669 (not concave)
Iteration 1:  log pseudolikelihood = -451.03362 (not concave)
Iteration 2:  log pseudolikelihood = -447.99032 (not concave)

```



```

Iteration 3: log pseudolikelihood = -447.59163 (not concave)
Iteration 4: log pseudolikelihood = -447.54727 (not concave)
Iteration 5: log pseudolikelihood = -447.54574 (not concave)
Iteration 6: log pseudolikelihood = -447.54558 (not concave)
Iteration 7: log pseudolikelihood = -447.54557 (not concave)
Iteration 8: log pseudolikelihood = -447.54556 (not concave)
Iteration 9: log pseudolikelihood = -447.54555 (not concave)
Iteration 10: log pseudolikelihood = -447.54555 (not concave)
Iteration 11: log pseudolikelihood = -447.54554 (not concave)
Iteration 12: log pseudolikelihood = -447.54554 (not concave)
--Break--
r(1);

```

Decided to go with this as final model

```

. xi:glm condlast i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1          _Isex1_1-99        (naturally coded; _Isex1_1 omitted)

```

```

Iteration 0: log pseudolikelihood = -600.83082
Iteration 1: log pseudolikelihood = -422.88983
Iteration 2: log pseudolikelihood = -416.63619
Iteration 3: log pseudolikelihood = -416.1272
Iteration 4: log pseudolikelihood = -416.12664
Iteration 5: log pseudolikelihood = -416.12664

```

Generalized linear models	No. of obs	=
680		
Optimization : ML	Residual df	=
672		
	Scale parameter	=
1		
Deviance = 832.2532789	(1/df) Deviance	=
1.238472		
Pearson = 680.1622114	(1/df) Pearson	=
1.012146		
Variance function: $V(u) = u*(1-u/1)$	[Binomial]	
Link function : $g(u) = \ln(u)$	[Log]	
	AIC	=
1.247431		
Log pseudolikelihood = -416.1266395	BIC	= -
3550.593		

(Std. Err. adjusted for 343 clusters in number)

condlast Interval]	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf.
_Icontint1_1 1.895311	1.387079	.2209337	2.05	0.040	1.015131
_Itime_2 1.183375	1.032148	.0720033	0.45	0.650	.9002471
_Itime_3 1.402286	1.125346	.1263242	1.05	0.293	.9030993
_Itime_4 1.351115	.9815029	.1600483	-0.11	0.909	.7130021
timegroup1 1.066091	.9478404	.0568558	-0.89	0.372	.8427064
_Isex1_2 1.269807	1.109441	.0764216	1.51	0.132	.9693287
_Isex1_99 1.471153	1.107799	.1603348	0.71	0.479	.8341885

Reduction in partners

This is the original model from table 21

```
. xi:glm partners i.contint1 i.time timegroup1, robust cluster(number)
family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -421.96532
Iteration 1:  log pseudolikelihood = -306.70125
Iteration 2:  log pseudolikelihood = -305.88977
Iteration 3:  log pseudolikelihood = -305.88918
Iteration 4:  log pseudolikelihood = -305.88918
```

```
Generalized linear models          No. of obs      =
457                                Residual df    =
Optimization      : ML              Scale parameter =
451                                                    (1/df) Deviance =
1                                                    (1/df) Pearson  =
Deviance          = 611.7783684
1.356493
Pearson           = 457.0034221
1.013311
```

```
Variance function: V(u) = u*(1-u/1)      [Binomial]
Link function      : g(u) = ln(u)        [Log]
AIC                                                         =
1.364942
```

Log pseudolikelihood = -305.8891842 BIC = -
2150.454

(Std. Err. adjusted for 283 clusters in
number)

```
-----+-----
```

partners	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
-----+-----					
--- _Icontint1_1	.8391233	.2784304	-0.53	0.597	.4379129
1.607918					
_Itime_2	1.397963	.2250887	2.08	0.037	1.019629
1.916678					
_Itime_3	1.155557	.2965805	0.56	0.573	.6987558
1.910985					
_Itime_4	1.073877	.3491345	0.22	0.826	.5678257
2.030924					
timegroup1	1.086795	.1417672	0.64	0.523	.8416132
1.403404					
-----+-----					

Adding sex, not significant

```
. xi:glm partners i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
```

```
Iteration 0:  log pseudolikelihood = -422.717
Iteration 1:  log pseudolikelihood = -307.11275
Iteration 2:  log pseudolikelihood = -305.17378
Iteration 3:  log pseudolikelihood = -305.15164
Iteration 4:  log pseudolikelihood = -305.15163
```

```
Generalized linear models                      No. of obs                      =
457
Optimization        : ML                      Residual df                      =
449                                              Scale parameter =
1                                              (1/df) Deviance =
Deviance            = 610.3032606                      (1/df) Pearson =
1.35925                                              (1/df) Pearson =
Pearson             = 456.1137665                      (1/df) Pearson =
1.015844
```

```
Variance function: V(u) = u*(1-u/1)                      [Binomial]
Link function        : g(u) = ln(u)                      [Log]

AIC                                              =
1.370467
Log pseudolikelihood = -305.1516303                      BIC                                              = -
2139.68
```

(Std. Err. adjusted for 283 clusters in number)

partners Interval)	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1 1.651051	.8588528	.2863931	-0.46	0.648	.4467629
_Itime_2 1.945505	1.416618	.2293007	2.15	0.031	1.031509
_Itime_3 1.961399	1.174617	.3072734	0.62	0.538	.7034395
_Itime_4 2.134771	1.112598	.3699239	0.32	0.748	.5798629
timegroup1 1.402344	1.082105	.1431259	0.60	0.551	.834996
_Isex1_2 1.436421	1.115054	.1440791	0.84	0.399	.865585
_Isex1_99 1.54306	.8459839	.2594206	-0.55	0.585	.4638115

Adding age did not work

```
. xi:glm partners i.contint1 i.time timegroup1 i.sex1 i.age1, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.age1         _Iage1_14-99        (naturally coded; _Iage1_14 omitted)
note: _Iage1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -417.65901 (not concave)
Iteration 1:  log pseudolikelihood = -313.27216 (not concave)
Iteration 2:  log pseudolikelihood = -306.26288 (not concave)
Iteration 3:  log pseudolikelihood = -304.78983 (not concave)
Iteration 4:  log pseudolikelihood = -304.58615 (not concave)
Iteration 5:  log pseudolikelihood = -304.57583 (not concave)
Iteration 6:  log pseudolikelihood = -304.57583 (not concave)
Iteration 7:  log pseudolikelihood = -304.57583 (not concave)
Iteration 8:  log pseudolikelihood = -304.57583 (not concave)
Iteration 9:  log pseudolikelihood = -304.57583 (not concave)
Iteration 10: log pseudolikelihood = -304.57583 (not concave)
Iteration 11: log pseudolikelihood = -304.57583 (not concave)
Iteration 12: log pseudolikelihood = -304.57583 (not concave)
Iteration 13: log pseudolikelihood = -304.57583 (not concave)
Iteration 14: log pseudolikelihood = -304.57583 (not concave)
Iteration 15: log pseudolikelihood = -304.57583 (not concave)
Iteration 16: log pseudolikelihood = -304.57583 (not concave)
Iteration 17: log pseudolikelihood = -304.57583 (not concave)
Iteration 18: log pseudolikelihood = -304.57583 (not concave)
Iteration 19: log pseudolikelihood = -304.57583 (not concave)
Iteration 20: log pseudolikelihood = -304.57583 (not concave)
Iteration 21: log pseudolikelihood = -304.57583 (not concave)
Iteration 22: log pseudolikelihood = -304.57583 (not concave)
```

```

Iteration 23: log pseudolikelihood = -304.57583 (not concave)
Iteration 24: log pseudolikelihood = -304.57583 (not concave)
Iteration 25: log pseudolikelihood = -304.57583 (not concave)
Iteration 26: log pseudolikelihood = -304.57583 (not concave)
Iteration 27: log pseudolikelihood = -304.57583 (not concave)
Iteration 28: log pseudolikelihood = -304.57583 (not concave)
Iteration 29: log pseudolikelihood = -304.57583 (not concave)
--Break--
r(1);

```

```

. xi:glm partners i.contint1 i.time timegroup1 i.sex1 age, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
note: _Isex1_99 dropped because of collinearity

```

```

Iteration 0: log pseudolikelihood = -407.7557
Iteration 1: log pseudolikelihood = -296.27709
Iteration 2: log pseudolikelihood = -294.6366
Iteration 3: log pseudolikelihood = -294.62548
Iteration 4: log pseudolikelihood = -294.62547

```

```

Generalized linear models                                No. of obs      =
441                                                       Residual df    =
Optimization      : ML                                   433
                                                         Scale parameter =
1                                                         (1/df) Deviance =
Deviance          = 589.2509477                          (1/df) Pearson =
1.360857
Pearson           = 440.2904437
1.016837
Variance function: V(u) = u*(1-u/1)                    [Binomial]
Link function     : g(u) = ln(u)                        [Log]
                                                         AIC            =
1.372451
Log pseudolikelihood = -294.6254738                    BIC            = -
2047.305

```

(Std. Err. adjusted for 269 clusters in number)

partners	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1	.8319239	.2766362	-0.55	0.580	.4335479
_Itime_2	1.379275	.222892	1.99	0.047	1.004838
_Itime_3	1.174348	.3021264	0.62	0.532	.7092623

_itime_4		1.120715	.3719551	0.34	0.731	.5847752
2.147836						
timegroup1		1.093956	.1439467	0.68	0.495	.8452701
1.415807						
_isex1_2		1.128254	.1511616	0.90	0.368	.8676897
1.467066						
age		1.022825	.0487401	0.47	0.636	.931622
1.122957						

 Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

Adding religion did not work

```
. xi:glm partners i.contint1 i.time timegroup1 i.sex1 i.relcats, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _itime_1-4          (naturally coded; _itime_1 omitted)
i.sex1         _isex1_1-99         (naturally coded; _isex1_1 omitted)
i.relcats      _irelcats_1-4      (naturally coded; _irelcats_1 omitted)
note: _isex1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -399.80218
Iteration 1:  log pseudolikelihood = -290.60211
Iteration 2:  log pseudolikelihood = -289.23274
Iteration 3:  log pseudolikelihood = -289.21646
Iteration 4:  log pseudolikelihood = -289.21643
Iteration 5:  log pseudolikelihood = -289.21643
```

Generalized linear models		No. of obs	=
435			
Optimization	: ML	Residual df	=
425			
		Scale parameter	=
1			
Deviance	= 578.4328649	(1/df) Deviance	=
1.361019			
Pearson	= 434.8438361	(1/df) Pearson	=
1.023162			
Variance function:	V(u) = u*(1-u/1)	[Binomial]	
Link function	: g(u) = ln(u)	[Log]	
		AIC	=
1.375708			
Log pseudolikelihood = -289.2164324		BIC	= -
2003.589			

(Std. Err. adjusted for 265 clusters in number)

partners Interval]	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf. Interval]
_Icontint1_1 1.608194	.8192063	.2819338	-0.58	0.562	.4172998
_Itime_2 1.896494	1.375083	.2255548	1.94	0.052	.9970256
_Itime_3 1.98221	1.15968	.3171832	0.54	0.588	.6784634
_Itime_4 2.189526	1.119618	.3831322	0.33	0.741	.5725181
timegroup1 1.434063	1.102995	.1477156	0.73	0.464	.8483566
_Isex1_2 1.423131	1.095555	.1462249	0.68	0.494	.8433805
_Irelcat_2 2.45347	1.530127	.3686054	1.77	0.077	.9542765
_Irelcat_3 1.275177	.8406474	.1787128	-0.82	0.414	.5541883
_Irelcat_4 2.329889	1.263616	.3944638	0.75	0.454	.6853224

Warning: parameter estimates produce inadmissible mean estimates in one or more observations.

Adding race did not work

```
. xi:glm partners i.contint1 i.time timegroup1 i.sex1 i.racecat, robust
cluster(number) family(binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
i.racecat      _Iracecat_1-4      (naturally coded; _Iracecat_1
omitted)
note: _Isex1_99 dropped because of collinearity
```

```
Iteration 0:  log pseudolikelihood = -422.93936 (not concave)
Iteration 1:  log pseudolikelihood = -357.5932 (not concave)
Iteration 2:  log pseudolikelihood = -351.68974 (not concave)
Iteration 3:  log pseudolikelihood = -350.54277 (not concave)
Iteration 4:  log pseudolikelihood = -350.52404 (not concave)
Iteration 5:  log pseudolikelihood = -350.52387 (not concave)
Iteration 6:  log pseudolikelihood = -350.52386 (not concave)
Iteration 7:  log pseudolikelihood = -350.52386 (not concave)
Iteration 8:  log pseudolikelihood = -350.52385 (not concave)
Iteration 9:  log pseudolikelihood = -350.52383 (not concave)
Iteration 10: log pseudolikelihood = -350.52382 (not concave)
Iteration 11: log pseudolikelihood = -350.52381 (not concave)
Iteration 12: log pseudolikelihood = -350.5238 (not concave)
Iteration 13: log pseudolikelihood = -350.52378 (not concave)
--Break--
r(1);
```

Decided to go with this as final model

```
. xi:glm partners i.contint1 i.time timegroup1 i.sex1, robust
cluster(number) family (binomial) link(log) eform
i.contint1      _Icontint1_0-1      (naturally coded; _Icontint1_0
omitted)
i.time          _Itime_1-4          (naturally coded; _Itime_1 omitted)
i.sex1         _Isex1_1-99         (naturally coded; _Isex1_1 omitted)
```

```
Iteration 0:  log pseudolikelihood =  -422.717
Iteration 1:  log pseudolikelihood = -307.11275
Iteration 2:  log pseudolikelihood = -305.17378
Iteration 3:  log pseudolikelihood = -305.15164
Iteration 4:  log pseudolikelihood = -305.15163
```

```
Generalized linear models                               No. of obs      =
457                                                    Residual df    =
Optimization      : ML                               Scale parameter =
449                                                    (1/df) Deviance =
1                                                    (1/df) Pearson =
Deviance          = 610.3032606
Pearson           = 456.1137665
1.015844
Variance function: V(u) = u*(1-u/1)                  [Binomial]
Link function     : g(u) = ln(u)                    [Log]
1.370467
Log pseudolikelihood = -305.1516303                  AIC            =
2139.68                                               BIC            = -
```

(Std. Err. adjusted for 283 clusters in number)

partners Interval]	Risk Ratio	Robust Std. Err.	z	P> z	[95% Conf.
_Icontint1_1 1.651051	.8588528	.2863931	-0.46	0.648	.4467629
_Itime_2 1.945505	1.416618	.2293007	2.15	0.031	1.031509
_Itime_3 1.961399	1.174617	.3072734	0.62	0.538	.7034395
_Itime_4 2.134771	1.112598	.3699239	0.32	0.748	.5798629
timegroup1 1.402344	1.082105	.1431259	0.60	0.551	.834996
_Isex1_2 1.436421	1.115054	.1440791	0.84	0.399	.865585
_Isex1_99 1.54306	.8459839	.2594206	-0.55	0.585	.4638115

Appendix 13. Posters Presented the 3rd SA AIDS conference in June 2007

The Ripple Effects of Sexual Behaviours: High School Pupils at Risk of HIV and AIDS

FRANK S, TAYLOR M, ESTERHUIZEN T, SULLIVAN KR & JINABHAI CC
Department of Public Health Medicine, Nelson R. Mandela School of Medicine, College of Health Sciences,
University of KwaZulu-Natal

Introduction

SA HIV Prevalence (15-24 yrs)

- 10.3%
- Males: 4.45%
- Females: 16.9% (HST, 2005)

Nearly half of all new HIV infections worldwide occur in young people (15-24 years) (UNAIDS, 2006)

Study Design

- Ethical clearance: UKZN
- Informed consent from schools, parents and pupils
- Cross sectional study
- All grade 10 pupils (n = 805)
- Mean age 15.4 years, SD=1.11
- All Wentworth public secondary schools

Aim

To identify sexual risk behaviours and demographic factors that place high school pupils at risk of HIV and AIDS

Data Collection & Analysis

- Self reported questionnaires
- SPSS (11.5)
- Binary logistic regression & Chi-square

Results: Gender Differences

- More males initiated sex below 13 years & more females initiated sex above 15 years (P < 0.001)
- More males preferred older partners than females (P = 0.002)
- More females were forced to have sex than males (P = 0.009)
- More males used alcohol at last sex than females (P = 0.04)

Gender Differences in Sexual Risk Behaviours of Wentworth Pupils (n = 265)

Gender Differences in Sexual Risk Behaviours of Wentworth Pupils (n = 265)

Results: Demographics

Association between Demographic Variables and Sexual Activity Among Pupils After Controlling for Socioeconomic Status

Factor	B	(S.E.)	P value	OR	Lower	Upper
African Traditional vs. Christianity	0.07	(0.07)	0.02	2.275	1.130	4.618
Both Parents Employed vs. Only Father Employed	0.79	(0.36)	0.01	1.472	1.005	3.333

Conclusions

- High school pupils are at high risk of HIV and AIDS, yet they continue to engage in risky sexual behaviours
- Gender differences in high risk sexual behaviours were evident
- Religious norms and parental supervision play an important role in sexual behaviour
- Sexual risk behaviours are predictors of other risky behaviours, which aggravate the former
- Prevention efforts need to be re-focused
- Sexual risk behaviours are reflective of a broad society in crisis

References

- Human Science Research Council (2005). South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey, 2005
- UNAIDS (2006). Report on the Global AIDS Epidemic. A UNAIDS 10th Anniversary Special Edition, Geneva.

Obstacles to AIDS Prevention Among High School Pupils in South Africa: Teacher Reports & Dropouts

Frank S. Taylor M. Jinabhai CC & Esterhuizen T

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Introduction

- The problem of school dropouts reflects the inadequacies in schooling systems which is compounded by environmental factors*
- No evidence exists of the adoption of protective behaviours following the Life Skills HIV/AIDS Programme in schools**



Objective

- To explore the factors that hindered teaching the Life Skills HIV and AIDS Programme (LSHAP)
- To explore demographic and sexual behavioural characteristics of drop outs from a school based HIV and AIDS intervention

Methods

- Ethical clearance: UKZN
- Informed consent schools, parents & pupils
- Intervention study, pre-test multiple post test design
- All public high schools in Wentworth
- 11 teachers were randomly selected and interviewed.
- All grade 10 pupils completed self-reported questionnaires at 4 time points (15-8 years, SD=1.1)
- A theory based AIDS prevention intervention was implemented

Data Analysis

- Teacher interviews were reported according to key themes
- Drop analysis was stratified by intervention and control groups
- Pearson Chi-Square

Results

- Teachers identified gaps in implementing the LHAP
- Schools had inadequate resources & had to supplement teaching material
- Schools reported inconsistent teacher training on LHAP
- Large pupil-teacher ratio hindered effective teaching
- Teachers reported discomfort in teaching sexually explicit material

Extracts of Teacher Interviews

Three of the eleven teachers had received training by the Department of Education on LHAP

- 'The training was of a substandard level and was knowledge based'
- 'We need more training and regular contact time with the DOE to keep updated on LHAP'
- 'We focused lessons on AIDS knowledge and ignored topics that were uncomfortable to talk about, e.g. anal/oral sex'
- 'How do we counsel HIV positive pupils? Health professionals and social workers are better equipped to do this'

Extracts of Teacher Interviews

- 'We have no qualified school counsellor. One teacher is assigned to juggle this task between academic duties'
- 'Most of our school audio-visual equipment does not work'
- 'Teaching HIV/AIDS theory did not produce behaviour change in pupils'
- 'Class sizes could go up to 50 pupils. How can we run groups in limited spaces? If the weather is good we can go outside'

Demographics and Sexual Behaviour of Drop outs

Pupils dropped out irrespective of

- Age
- Sex
- Race
- Risky or Protective Sex
- Intervention or control group

* 80% drop out was from 15-16

Dropouts from Time 1 to Time 4

	Number of Pupils (%)	Intervention Group	Control Group	Total
Time 1	100%	100%	100%	100%
Time 2	95%	95%	95%	95%
Time 3	85%	85%	85%	85%
Time 4	75%	75%	75%	75%

Reports of reasons for high drop out from intervention

- High pupil absenteeism
- Pupils were present in school but loitered around school property
- Pupils could not cope with social problems
- Pupils were frustrated as they could not read at high school level
- Some were expelled due to behaviour problems

Conclusions

AIDS prevention efforts among high school pupils have stagnated due to:

- The high prevalence of drop outs from school programmes.
- The lack of a culture of learning and teaching in schools (COLTS) &
- Gaps in implementing LHAP

References

*Skanda, A. (2004) Who Drops Out of School in South Africa? The Influence of Individual and Household Characteristics. Population Studies Center, Philadelphia

**Reddy, P. & James, S. (2007) Programming for HIV Prevention in South African Schools: A Preliminary Report on Program Implementation. The Population Council, Horizons & Medical Research Council Report, Washington DC

Email: frank.taylor@ukzn.ac.za
<http://www.hivprevention.org.za>
 Medical Research Council



ORIGINAL ARTICLES

Risky sexual behaviours of high-school pupils in an era of HIV and AIDS

S Frank, T Esterhuizen, C C Jinabhai, K Sullivan, M Taylor

Objective. To identify risky sexual behaviours and demographic factors that place high-school pupils at risk of HIV and AIDS.

Methods. A cross-sectional study was undertaken to explore factors influencing the sexual behaviour of high-school pupils (mean age 15.4 years; SD 1.11). Structured self-reported questionnaires were completed by all grade 10 pupils (N=805) at all the Wentworth, Durban, public high schools.

Results. Significant gender differences in sexual practices were reported, such as males being more likely to engage in sexual activity than females (OR 4.92; $p<0.001$). More males (24.8%) initiated sex before age 12, compared with more females (30%) who initiated sex between 16 to 20 years of age ($p<0.001$). Significantly more males preferred older partners than females ($p=0.002$), more females were forced to have sex than males

($p=0.009$), and more males used alcohol on the last occasion of sex than females ($p=0.04$). Religious affiliation and parental supervision were found to have a significant effect on sexual activity among pupils.

Conclusions. High-school pupils are at high risk of HIV and AIDS, yet they continue to engage in risky sexual behaviours. Preventive efforts therefore need to be aggressively up-scaled and redirected towards specific risky practices, taking gender differences into account. Contextual factors such as religious norms and parental supervision also require greater attention. Risky sexual behaviours are reflective of a broader crisis in society.

S Afr Med J 2008; 98: 394-398.

Overview

The high and increasing prevalence of HIV/AIDS among youth in South Africa suggests that prevention efforts need to be re-examined. Condom promotion, STI programmes, the HIV and AIDS Life Skills intervention, and mass media communications have been deficient in reducing the incidence of HIV. HIV prevalence among youth in the 15-24 age group was 10.3%, but has increased among females to 16.9% and decreased among males to 4.4%. Youth in South Africa nevertheless continue to practise risky sexual behaviours.¹ Many have had their first sexual experience by age 14 or younger, even though the legal age of consensual sex is 16.² The 'fertility conundrum', whereby girls have to demonstrate their fertility before marriage, is evident in many African cultures, and further perpetuates the early age of sexual activity among youth.³

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Gender disparities have an impact on gender power imbalances and age-mixing.^{4,5} Among adolescents in Mthatha (previously known as Umtata) in Eastern Cape Province, boys defined 'masculinity' in terms of the number of sexual partners, choice of main partner in terms of her desirability to other males, and ability to control their girlfriends - often by force. Males who were celibate were pressurised by peer groups to be sexually active, or else it was assumed they were 'scared' of women.⁶

The escalating high incidence of sexual abuse, violence and rape among children of all ages, reinforces gender-based violence in relationships.⁷ Nationally, 1.5% of adult females reported having been raped before the age of 15,⁸ and the Human Sciences Research Council reported in 2005 that 15% of South African rape victims were under 12 years of age. In a number of studies of South African secondary school pupils, 72% of pregnant teenagers, and 60% of teenagers who had never been pregnant, reported that they had had coercive sex - statistics which recur in other studies.⁹

Similarly, Thai male adolescents felt that girls' refusal to have sex was an expression of playing 'hard to get', and not that they did not want sex.¹⁰ In addition, a strong correlation was reported to exist between gender-based violence (GBV) and HIV and AIDS among students at two middle schools in Thailand where, even in steady dating relationships, 45% of Thai adolescents reported engaging in some form of sexual violence, and 5% had raped their girlfriends and performed anal sex.¹¹

In addition, adolescent relationships with older partners are risky because the latter often have a history of multiple relationships. Negotiating of safe sex practices is diminished