Substance use and sexual risk behavior among orphaned and non-orphaned youth in South Africa

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Abstract

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(Under the direction of Sian Curtis, PhD)

Substance use carries many health risks for youth and has also been associated with high risk sexual behavior. Risky sexual behavior is the primary means by which human immunodeficiency virus (HIV) is transmitted in sub-Saharan Africa. Adult deaths due to HIV contributed to over three million orphaned children and adolescents residing in South Africa in 2007. There has been ongoing concern that parental absence and potentially altered family, school, community, and peer relationships may leave orphaned youth at greater risk of engaging in substance use and risky sexual behaviors, thereby increasing their exposure to HIV.

This dissertation utilized data from a nationally representative survey of 11,904 South African youth conducted in 2003. Gender-stratified multivariable models were fitted in order to: 1) examine the relationship between factors, from five domains (individual, peer, school, family, and community) with substance use among South African youth, and to determine whether orphaned youth were more likely to engage in alcohol or drug use, compared with non-orphans and 2) examine the relationship between substance use and risky sexual behavior among South African youth and, again, consider whether orphaned youth were more likely to have had multiple partners, or to have used condoms irregularly in the previous month.

Findings showed that: a) along with individual factors, family and community domains were associated with substance use while risky sexual behavior was largely associated with individual factors b) females were more influenced by family factors while males were more influenced by community variables c) compared with non-orphaned youth, paternally orphaned males were more likely to have consumed alcohol and paternally orphaned females were more likely to have used drugs c) after controlling for substance use, maternally orphaned females were more likely to have had multiple partners and orphaned males were less likely to have used condoms regularly.

Ongoing research is needed to better understand the pathways which increase the vulnerability of some orphaned youth. At the same time, policies and programs directed at reducing risky behavior among all South African youth should recognize male versus female differences and include families and communities, particularly when addressing substance use.

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Table of Contents

List of Tables

List of Figures

Chapter 1

Introduction

Drug and alcohol use is on the rise in South Africa, as it is in much of sub-Saharan Africa, and contributes to significant morbidity and mortality, as well as to the HIV/AIDS crisis, among youth (Parry, Myers, Morojele, Flisher, Bhana, Donson et al., 2004). Injected drugs are often associated with needle sharing and a high risk of viral transmission (UNAIDS, 2006a) and all drugs are associated with increased risk behaviors, including sexual risk behaviors (UNAIDS, 2006a). High risk sexual behavior is, in turn, associated with increased incidence of HIV (Edwards, Halpern, & Wechsberg, 2006; UNAIDS, 2006a). Adolescent substance use may therefore be associated with HIV transmission directly through injected drug use, and indirectly, by increasing risky sexual behaviors.

Of the 40 million people living with HIV/AIDS in the world, 29.4 million live in Africa, and youth in sub-Saharan Africa have the highest rates of HIV infection in the world (UNAIDS, 2008). Adding to the social and health burden in countries such as South Africa is a burgeoning orphan crisis, with over 3 million orphaned children and adolescents living in the country in 2007 (Meintjes, 2009). While the high rates of infection among adolescents in general may be related to their life-stage which is associated with increased risk taking (Call, Riedell, Hein, McLoyd, Peterson, & Kipke, 2002), the millions of orphaned adolescents may be particularly vulnerable to substance use, risky sexual behavior and resulting HIV infection (UNICEF, 2004). Parental loss leaves youth needing to cope with stress and anxiety which have been shown to be

associated with risky behavior (Perrino, Gonzalez-Soldevilla, Pantin, & Szapocznik, 2000). Reduced attachment, lack of parental controls, support or modeling, all of which may come with parental loss, decrease the protections which benefit all youth and enhance the likelihood of risky behavior (Cluver, Gardner, & Operario, 2007; Kelley, Schochet, & Landry, 2004; Kinsman, Romer, Furstenberg, & Schwarz, 1998). Many programs are designed to address HIV/AIDS and many focus on orphaned youth. It is important to know if this population is, in fact, more vulnerable than other adolescents in terms of engaging in substance use or risky sexual behavior, to determine the relationship between substance use and risky sexual behavior, and to determine if particular factors enhance or protect orphaned youth from risk taking. These findings can provide focus and direction for interventions.

Background

AIDS in South Africa

South Africa is a country of approximately 49 million people located at the southern-most tip of Africa (CIA, 2009). Human Immunodeficiency Virus (HIV), the precursor of Acquired Immune-deficiency Syndrome (AIDS,) has become a significant public health concern. The largest number of people with HIV in the world, 5.7 million, live in this country (UNAIDS, 2008). Deaths from HIV in South Africa contributed to over 3 million orphaned children and adolescents, ages 0 to 17, living in the country at the end of 2007(Meintjes, 2009) . HIV prevalence in South Africa was estimated at 18.8% for 15-49 year olds in 2007 and remains significantly higher than the average prevalence rate of 5.5% reported for much of sub-Saharan Africa (CIA, 2009; UNAIDS, 2008). Differences in HIV infection rates and prevalence can be found by age, gender, region of the country, urban versus rural residence, and racial group. In South Africa young people ages 15-24 accounted for 40% of the new infections in 2006 and

young women, and those living in urban areas, are disproportionately affected (Pettifor, Rees, Kleinschmidt, Steffenson, MacPhail, Hlongwa-Madikizela et al., 2005; UNAIDS, 2006a). Racial differences (four racial groups--Black African, White, Colored, and Asian--continue to be identified for statistical purposes) point to an increased vulnerability to HIV for black South Africans who constitute almost 80% of the population (Pettifor, Rees, Kleinschmidt et al., 2005). However, the country's complex history of occupation, resulting in Black and Colored populations living in the most disadvantaged regions with limited resources and poor health expenditure, makes it difficult to untangle race from socio-economics and issues of access to health care (Marks & Andersson, 1987; Pettifor, Rees, Kleinschmidt et al., 2005).

Transmission of HIV, apart from mother-to-child, occurs predominantly through the exchange of body fluids from an infected person. This may occur via unprotected sexual contact, through use of contaminated needles, or other exchange of contaminated blood (CDC, 1999). Women, engaging in heterosexual contact have been shown to develop HIV more readily than men (European_Study_Group, 1992; Pettifor, Hudgens, Levandowski, Rees, & Cohen, 2007). This may be related to higher viral loads of HIV in semen or to the increased ease of transmission if vaginal mucosa has been impaired, as might occur with infection or trauma (European_Study_Group, 1992; Royce, Sena, Cates, & Cohen, 1997).

Risk behaviors and HIV transmission

Behaviors which have been associated with contraction of sexually transmitted infections, in addition to HIV, include substance use, multiple partners, lack of condom use as well as early sexual debut and sexual violence (CDC, 1999; Hallman, 2004; Parry, Carney, Peterson, & Dewing, 2007).

Early sexual debut is of concern because every instance of sexual activity, if not accompanied by condom use, adds risk. Early debut is also related to multiple partnerships as a person who commences sexual activity earlier has more opportunity for multiple partners before entering a stable relationship. Given that the HIV virus appears to be more readily transmitted when vaginal mucosa is immature and easily traumatized, young females are thought to be more vulnerable than males to the risk of HIV infection through early sexual debut (Cheetham & Bogdanovich, 2006; Pettifor, Hudgens, Levandowski et al., 2007).

Multiple partners enhance risk, particularly if relationships are concurrent. When condoms are not used or are used intermittently, each new partner represents an opportunity for infection. Concurrency of partners adds to the risk as the reduced time between partners appears to enhance viral transmission (Doherty, Shiboski, Ellen, Adimora, & Padian, 2006; Gregson, Nyamukapa, Garnett, Mason, Zhuwau, Carael et al., 2002; Royce, Sena, Cates et al., 1997). However, any increase in life time partners represents further opportunities for infection and increased risk of HIV transmission (Pettifor, Rees, Kleinschmidt et al., 2005).

Condom use is a protective behavior in the transmission of HIV. However, consistency of use is important. Pettifor et al (2005) found that while 57% of male adolescents and 45% of females stated that they had used condoms at last sex, 77% said that they did not always use them with their most recent sexual partner. Inconsistent use, while preferable over no use, introduces risk of viral transmission. In addition, when multiple partners are involved, studies have shown that condoms are least likely to be used with main partners, thereby potentially placing main partners at increased risk.

Injected drug use has been directly associated with increased HIV infection, through the sharing of contaminated needles (CDC, 1999) and alcohol use has been shown to be associated with sexual risk for infection (Kalichman, Simbayi, Kaufman, Cain, & Jooste, 2007). In South

Africa, as in most of sub-Saharan Africa, injected drug use is not great, although it is increasing. The United Nations Office on Drugs and Crime reports that illicit drug use, including marijuana, cocaine, and heroin is rising particularly among women and adolescents. With a rise in heroin comes a rise in injected drug use in some sub-Saharan countries, including South Africa (UNODC, 2002). However, alcohol and all illegal drugs contribute to sexual risk taking and enhanced exposure to sexually transmitted infections including HIV (Parry, Carney, Peterson et al., 2007; Parry, Myers, Morojele et al., 2004; Simbayi, Kalichman, Jooste, Mathiti, Cain, & Cherry, 2004).

Risk taking in adolescents

HIV infection is clearly associated with risky behaviors and risk taking in adolescence is of worldwide concern (UNICEF, 2005). Adolescence, defined by the World Health Organization (WHO) as persons between ages 10 to 19 (WHO, 2001) provides a time for adaptation to a more adult life-stage and can contribute to increased independence, self efficacy, development of independence and positive behavior and coping patterns. However, it is also understood to be a time of increased morbidity and mortality and adolescents can develop negative behavioral patterns which may impact their health into adulthood (Call, Riedell, Hein et al., 2002; Dehne & Riedner, 2001). Levels of risk taking have been found to be related to individual personality, social and peer input, parental factors, and environmental stressors (DiMauro, 1997; Kelley, Schochet, & Landry, 2004). Substance use and high risk sexual activity are among behaviors of concern for adolescents. Substance use can not only leave an adolescent with a lifelong addiction which impacts his or her life opportunities but has also been shown to enhance sexual risk taking (DiClemente & Crosby, 2003; Lowry, Holtzman, Truman, Kann, Collins, & Kolbe, 1994). High risk sexual activity predisposes youth to sexually transmitted

diseases, unintended pregnancy, and the morbidity and mortality attached to both of those outcomes (Meekers, Gage, & Zhan, 1995; WHO, 2005).

Adolescents are not always aware of the extent to which their behaviors can affect their health (Kelley, Schochet, & Landry, 2004). In 2005, 50% of new HIV infections occurred in 15-24 year olds (WHO & UNAIDS, 2006). Sexual risk behaviors have been shown to drive the AIDS epidemic in sub-Saharan Africa, while injected drug use and the sharing of contaminated needles has been found to be a major source of infection in epidemics in Asia and Eastern Europe (UNAIDS, 2006b, 2008). However this may change in South Africa as injected drug use increases (Parry, Myers, Morojele et al., 2004). In addition, research indicates substance use and sexual risk taking often cluster, or occur "together" in adolescents, further increasing risk in this population(DiClemente & Crosby, 2003; DiMauro, 1997; Lowry, Holtzman, Truman et al., 1994). It is therefore important that we identify the correlates and pathways of both substance use/abuse and sexual risk behaviors for adolescents in South Africa.

Substance use among youth in South Africa

Substance use, predominantly alcohol, has a long history in South Africa. Controls placed on the production and sale of alcohol for black Africans led to the development of informal and illegal drinking establishments, and alcohol has been used as an incentive and source of payment for labor (Pithey & Morojele, 2002). While substance use has been reported on for years, the reports have been primarily focused on adults and most often based on regional, not national, data.

One of the first national surveys of drug and alcohol use in black youth was completed in 1994 (Rocha-Silva, 1996). This study examined use patterns among 1,376 youth ages 10-21 and found that alcohol use (at least weekly) was considered to be an entry into adulthood. This is

true especially among males and occurs most often in settings with friends with the main reasons for drinking being enjoyment and social pressure. While alcohol appeared to be the primary substance used by youth in this study, other regional reports have shown that alcohol is often an entry point to other drug use (Flisher, Ziervogel, & Chalton, 1993).

In 1996 a network on drug use, the South African Community Epidemiological Network on Drug Use (SACENDU) was established with sentinel sites located in the port cities of Cape Town, Durban, and Port Elizabeth, Gauteng province (including Pretoria and Johannesburg), and the rural Mpumalanga province. Included in the network were treatment centers, psychiatric facilities, and trauma units. Data for 1997 to 2001 showed that alcohol is the most commonly used substance followed by cannabis (marijuana) and mandrax (a methaqualone), and indicated that drug use is increasing. Heroin use was found to be on the rise in urban regions such as Capetown and Pretoria and a substantial number of patients (45% and 38% respectively) reported some injection drug use. Overall males seemed to use both alcohol and drugs more than females but more females were seeking treatment for cocaine and heroin (Parry, Bhana, Pluddemann, Myers, Siegfried, Morojele et al., 2002; Parry, Myers, Morojele et al., 2004).

As part of the SACENDU studies, Flisher et al, (2003) also looked at 8th and 11th grade students in Cape Town and found higher use of alcohol and cannabis among black males and white females in the 8th grade but increasing use of substances by all students by the 11th grade. This study also found that cannabis use had increased 55%, compared with results from a study done in 1992 (Flisher, Ziervogel, & Chalton, 1993). The group least affected by substances seem to be black females (Flisher, Parry, Evans et al., 2003; Flisher, Ziervogel, & Chalton, 1993; Rocha-Silva, 1996).

These findings do not appear to be regionally limited. Taylor et al. (2003) looked at 10th graders in Kwa-Zulu Natal and also found alcohol and cannabis to be the most commonly used

substances and that overall males used significantly more than females. Similarly in a study done in the in the Pietersburg area of the Northern Province, 39% of secondary students admitted to consuming alcohol and 12% of students used illegal drugs. Again, most of those using were males and most began using at a young age; with mean age of 14.9 for first drug use and 15.3 for alcohol use (Madu & Matla, 2003).

The South African National HIV Prevalence survey from 2005 also reported substance use indicating that 27.9% of the population (youth and adults) were "high risk" drinkers (based on an alcohol use identification scoring system where low risk scores identifying drinking within medical and legal guidelines and high risk scores identify drinking done in a hazardous or harmful manner). Males were again more likely to drink than females and white males more so than those from other racial groups, although white males were also more likely to be "low risk" drinkers. High risk drinkers were most often over age 25 and found to be living in "formal areas" (established residential regions rather than temporary residential areas). Youth ages 15-24 were the next highest risk group. Approximately 2% of the population admitted to non-injected drug use. However, of interest, 4.7% admitted using injected drugs (Shisana, Rehle, Simbayi, Parker, Zuma, Bhana et al., 2005).

All of these reports confirm that alcohol and drug consumption is a growing concern in South Africa and that fairly young adolescents seem to be using both drugs and alcohol. In addition, a number of studies seem to indicate that not only is alcohol and marijuana use increasing but that there is a rise injected-drug use (Parry, Bhana, Pluddemann et al., 2002; Shisana, Rehle, Simbayi et al., 2005). Age, gender, and race all appear to differentially be associated with use. However, while many individual regions of the country have been considered in various studies, and the National HIV Prevalence survey included some

adolescents in their initial review, none has focused on all South African adolescents or considered both alcohol and drug use.

Risky sexual behavior among youth in South Africa

A number of studies have been done in South Africa which describe the sexual behavior of adolescents in the region. These reports paint a picture which includes earlier male sexual debut, inadequate knowledge of HIV, inconsistent condom use, and multiple partnerships, particularly among males.

In 2003, Eaton et al. published a review of papers, reporting on sexual behavior of youth between 1990 and 2000, and included 75 studies of adolescents and young adults ranging widely from ages 14-35. They found that 50% of the adolescents, based on results of the varied studies, were sexually active by age 16. Males reported earlier sexual debut and more partners than females. In addition, 10-30% of those (predominantly young men) with multiple lifetime partners, had concurrent partners. Inconsistent condom use was found, with 50-60% of both males and females noted not to be using them at all.

While knowledge is not a sufficient motivator of behavior, it is necessary as a first step towards change. Findings from 8 districts in South Africa in 2001-2002 note that youth ages 12-22 had high knowledge of HIV/AIDS (97%) but did not fully understand mechanisms of prevention, especially how HIV is transmitted via body fluids and blood. Females were more knowledgeable than males in this population. This study also found that males tended to initiate sex at an earlier age than females, and that the majority (73%) of sexually active male and female youth reported not having used a condom at first intercourse and not using them consistently. Again, more males than females (49% versus 13%) reported multiple partners in the previous

year and those with multiple partners were significantly more likely to not have used a condom or used it inconsistently compared with youth with one partner (Horizons, 2004).

Most recently, Pettifor et al, looked at 15-24 year old South Africans in a large national study done in 2003-2004, and found that while sexual debut was not at a particularly young age (mean age was 16.7), by age 19, more than 70% of males and 90% of females reported being sexually active in the previous year and the majority had more than one lifetime partner. In this study, females were more likely to have had multiple partners than males, raising the question of whether females were engaging in transactional relationships. HIV prevalence was also greater among females than among males (Pettifor, Rees, Kleinschmidt et al., 2005). In a community based survey more young women than men had experienced gonorrhea or Chlamydia infections and gonorrhea was associated with a higher prevalence of HIV. Greater concurrent infection among women may have contributed to the HIV prevalence of 20% among females versus 7.5% among males (Pettifor, Kleinschmidt, Levin, Rees, MacPhail, Madikizela-Hlongwa et al., 2005). Young women were also more likely to have older sexual partners. Condom use was, once again, found to be inconsistent, particularly among women.

On the other hand, two studies note reductions in reported numbers of partners and increases in reported consistency of condom use among youth in South Africa in recent years (Simbayi, Chauveau, & Shisana, 2004; Zambuko & Mturi, 2005), leading the authors to believe that prevention programs may be beginning to be effective. However, 50% of those surveyed were still not using condoms, many adolescents continue to engage in high risk behaviors, and most studies point to ongoing risk of HIV transmission and infection among South African youth with females at enhanced risk (Buga, Amoko, & Ncayiyana, 1996; MacPhail & Campbell, 2001; Pettifor, Rees, Kleinschmidt et al., 2005; Shisana, Rehle, Simbayi et al., 2005).

The relationship between substance use and risky sexual behavior

Alcohol and drug use among adolescents is particularly problematic when it occurs in the context of a high HIV prevalence rate. While the pathways are not completely clear, substance use has been associated with increases in sexual risk behaviors which, in turn, enhance the likelihood that an individual might contract HIV through sexual risk taking. Alcohol use has been found to be associated with transactional sex and contraction of sexually transmitted infections, including HIV (Kalichman & Simbayi, 2004; Simbayi, Kalichman, Jooste et al., 2004), as well as unprotected sex and multiple partners (Weiser, Leiter, Heisler, McFarland, Percy-de Korte, DeMonner et al., 2006) among adults. In a study in Cape Town, alcohol was implicated with condom failure due to improper use (Simbayi, Kalichman, Jooste et al., 2004).

Similar findings have been noted amongst adolescents. Mataure et al. (2002) found that alcohol and marijuana use was common among both male and female (32% and 40%) adolescents recruited in nightclubs and alcohol selling venues in Zimbabwe, and that this use was associated with casual sexual relationships and transactional sex. The venues in which these risk behaviors occurred may have enhanced the likelihood of risk taking. In Ethiopia, a study of 20,000 15-24 year olds found a significant linear relationship between intake of alcohol and of "Khat" (an herbal stimulant) and both sexual initiation and unprotected sex (Kebede, Alem, Mitike, Enquselassie, Berhane, Abebe et al., 2005). Reports from South Africa have also found associations between substance use and sexual risk behaviors (Madu & Matla, 2003; Reddy, Panday, Swart, Jinabhai, Amosun, James et al., 2003). However, the findings regarding condom use include both significant (Palen, Smith, Flisher, Caldwell, & Mpofu, 2006) and insignificant (Flisher & Chalton, 2001) associations between alcohol and /or marijuana use and inconsistent condom use. More consistent use was often found among older youth. Rural location did not

seem to alter the positive association between alcohol use and multiple partnerships(Mpofu, Flisher, Bility, Onya, & Lombard, 2006).

Where associations between substance use and sexual risk behaviors have been identified, they point to a number of pathways. These include the chemical consequences of drug use which includes reduced inhibition and an enhanced "risk tolerance" or lack of fear of consequences (Mpofu, Flisher, Bility et al., 2006; WHO, 2006) and the reduced ability to navigate protective behaviors such as using a condom (Palen, Smith, Flisher et al., 2006). Personality characteristics such as sensation-seeking may also drive alcohol use in sexually risky circumstances (Kalichman, Simbayi, Kagee, Toefy, Jooste, Cain et al., 2006). While factors such as socio-economics (SES) and personality may account for some of the relationship, alcohol and drug use also increases the potential for aggressive behavior at the same time that the fear of consequences is reduced, thereby contributing to enhanced violence, including sexual violence. Other authors state that community and societal norms which accept the premise that alcohol facilitates aggression leads to drinking, which is then used as the reason (or excuse) that "understandable" violence is carried out (Field, Caetano, & Nelson, 2004; Jewkes, 2002). In Kenya women ages 15-24 reported that alcohol use before sex was associated with a higher risk of both physical violence and sexual coercion. HIV prevalence was also higher when women reported having consumed alcohol before sex, and particularly when sexual coercion was also present (Zablotska, Gray, Koenig, Serwadda, Nalugoda, Kigozi et al., 2006). These authors also believe that alcohol consumption leads to reduced inhibition which then lead to coercion and violence. Venues of drinking, such as beer halls or parties where alcohol consumption and sexual behavior are both normative, can create an environment where both may occur or where substance use can easily lead to risky sexual behavior (Mataure, McFarland, Fritz et al., 2002) (Mataure, et al 2002). This is in accord with findings that show that risk behaviors, especially

among adolescents tend to "cluster" such that engagement in one risky behavior puts an adolescent in a more likely posture of engaging in other risky behavior (Blum & Mmari, 2005).

The studies all point to associations between substance use and risk behaviors among youth in South Africa. As most are done from cross-sectional reports, causal associations cannot be made but the relationships are present. The most consistent outcomes are related to the association between substance use, multiple partners, and sexual violence with differing outcomes related to condom use. However, many authors note that we still do not fully understand the determinants of use and misuse of substances and the pathways which then contribute to the risky sexual behaviors (Parry & Pithey, 2006; Pithey & Morojele, 2002).

Factors associated with risky behavior in adolescents

The premise of this study is that substance use is differentially associated with orphaned versus non-orphaned adolescents and that use of alcohol and drugs will lead to other risky behavior. But what leads an adolescent to engage in substance use or sexual risk in the first place? And what are the factors which might either increase or decrease the probability of that engagement? These factors form the pathways to risky behavior. An understanding of what they are and how they operate in the lives of youth is necessary in order to design effective prevention programs.

Predictors or moderators of risky behavior may be categorized as either individual or social/contextual. Eaton, reviewing 10 years of research on sexual behaviors of youth in South Africa, considers some of these contextual factors to be more proximal while others are more distal (Eaton, Flisher, & Aarø, 2003). A number of social-cognitive theories have been used to identify personal and inter-personal variables associated with HIV sexual-risk behaviors, predominantly in western countries(Bandura, 1997; Blum, Beuhring, Shew, Bearinger, Sieving, &

Resnick, 2000; Eaton, Flisher, & Aarø, 2003). At the same time, Primary Socialization theory (Oetting & Donnermeyer, 1998) has been used to consider substance use among adolescents in the United States, finding that the relationships between parents, peers, and schools have the most influence on adolescent behavior with peers directly influencing the individual adolescent. However, the theories which may predict sexual or substance use behavior in Western countries may not be directly applicable to African and other developing countries and African researchers emphasize the need to include factors which go beyond those of the nuclear family when considering what impacts the behavior of youth (Eaton, Flisher, & Aarø, 2003; Morojele, Flisher, Muller, Ziervogel, Reddy, & Lombard, 2002). The factors considered for this study combine constructs from all of these theories (see Theoretical and Conceptual framework section, for greater detail) and anticipate that youth behavior is related to a number of domains including personal factors(most proximal), family factors, peers, school factors, and then community factors (most distal). The factors in the different domains have not all been associated with both substance use and sexual risk behaviors, but have been associated with at least one of the outcomes of interest.

Individual factors

Drawing from social cognitive theory, personal variables which may influence both substance use and sexual risk behaviors include knowledge, a sense of competence, perceived vulnerability, self-efficacy and intentions, and self-esteem and perceived relationship control. Stress, while usually due to external factors, imposes personally-felt pressures on the individual which may exacerbate risk behaviors. Sexual behavior may be used to establish social status and independence but also may be a way adolescents distract themselves from negative emotions and a means of coping with difficult or stressful events (Blum, Beuhring, Shew et al., 2000; Windle &

Windle, 2003). Studies done in sub-Saharan Africa, point to stress as a precursor of both substance use and risky sexual behavior. Kenyan youth responded to stress and found means of coping in the use of drugs, alcohol and providing sex for favors (Balmer, Gikundi, Billingsley, Kihuho, Kimani, Wang'ondu et al., 1997). Relief from stress and relaxation has also been associated with alcohol consumption among South African teens (Rocha-Silva, 1996). Depression, which is related to stress, has been found to be associated with both alcohol use and sexual risk behaviors, such as multiple partners (Weiser, Leiter, Heisler et al., 2006). Unfortunately, what may begin as stress relief can continue in increasing substance use and in use of multiple substances (Duncan, Tildesley, Duncan, & Hops, 1995). If young adolescents begin to use alcohol and drugs as a means to relieve stress, use may increase over time, placing adolescents at increasing risk. This may be a particularly important antecedent for orphaned youth.

Knowledge can also influence behavior although it does not always do so. Mataure et al. (2002) found that among youth at nightclubs and drinking venues in Zimbabwe, youth engaged in risky sexual behaviors, with alcohol reducing inhibition, despite accurate knowledge of HIV. Disinclination to use condoms has been found to be related to the perception that condoms decrease sexual pleasure, or, among females, due to a lack of power to insist on their use, rather than a lack of knowledge about their effectiveness (MacPhail & Campbell, 2001; Morojele, Kachieng'a, Mokoko, Nkoko, Parry, Nkowane et al., 2006). On the other hand, Simbayi et al. (2005) found that, among youth in Cape Town, individual misconceptions and inaccurate knowledge about how HIV is transmitted did influence HIV risk behaviors such as condom use, as well as numbers of partners. Less education and less AIDS related-knowledge as well as negative attitudes about condoms put especially the young males at risk. While knowledge may not assure risk reduction, accurate information about behaviors which increase the risk of HIV

transmission as well as accurate knowledge of the effectiveness of protective means such as condom use is still needed to provide the potential for safer sexual behavior.

A sense of competence, perceived vulnerability to negative outcomes, self-efficacy and intentions influence how adolescents negotiate sexual interactions and may thereby increase or decrease their risk exposure (Blum, Beuhring, Shew et al., 2000; Dias, 2007; L'Engle, Christine, & Jane, 2006). While these personal variables appear to be influential in adolescent behavior, they may not operate in the same manner under all circumstances or be equally important with all outcomes.

Competence and perceived invulnerability are related both to risk outcomes and to each other and are both exacerbated by substance use. Teens who have a greater sense of sexual competence have been found to be more susceptible to initiating sex (L'Engle, Christine, & Jane, 2006). Alcohol and drugs, may convey that sense of competence to a teenager and perceived invulnerability has been associated with both substance use and sexual risk behaviors including lack of condom use and multiple partners (MacPhail & Campbell, 2001; Morojele, Kachieng'a, Mokoko et al., 2006; Parry, 1998). The use of alcohol or drugs can, in turn, further increase the perception of invulnerability to negative outcomes (Mataure, McFarland, Fritz et al., 2002). Perceived invulnerability is a hallmark of adolescence and Eaton et al (2003) found that even youth who had already contracted a sexually transmitted disease, did not perceive themselves to be vulnerable to contracting HIV.

Self-efficacy is a complicated factor. Studies have shown that when South African young adults felt capable of using condoms (self-efficacy) they reported greater use (Eaton, Flisher, & Aarø, 2003; Reddy, Meyer-Weitz, Van den Borne, & Kok, 2000). However, this factor does not always operate in a protective manner, as was noted above, where a sense of competence (a form of self-efficacy) in fact enhanced sexual activity (L'Engle, Christine, & Jane, 2006).

Intentions have also been found to be strong predictors of adolescent behavior (Dias, 2007; Kinsman, Romer, Furstenberg et al., 1998) and while intentions can be positively influenced by self-efficacy, they may also be influenced by factors such as fear or anxiety. A study of Portuguese adolescents found that the fear that condoms would interfere with "sexual performance" reduced their intentions to use them, regardless of their sense of efficacy about how to use them (Dias, 2007). So, the presence of anxiety or fear of failure may neutralize the positive effect of self-efficacy.

Low self-esteem can lead to a search for affirmation from peers or from partners, and has been associated with earlier onset of sexual activity and having more sexual partners (Perkel, Strebel, & Joubert, 1991). A person with low self concept may be less likely to negotiate condom use if their partner is unwilling, or may be more likely to tolerate sexual violence in an effort to avoid rejection (Eaton, Flisher, & Aarø, 2003; Perkel, Strebel, & Joubert, 1991).

Peer factors

Peer norms, pressure, behavior, and the assumptions about peer behavior, provide some of the strongest influences on individual adolescent intentions and behavior (Blum, Beuhring, Shew et al., 2000; Dias, 2007; Kinsman, Romer, Furstenberg et al., 1998). Alcohol and drugs have been associated with peer socialization and social status (Windle & Windle, 2003). Morojele et al., (2002), studying South African adolescents on the Cape Peninsula found that factors such as peer anti-social behavior and peer substance use influenced an adolescent's use of alcohol, marijuana, and tobacco. Parry et al. (2004) also found that among 11-17 year olds in nine communities in Cape Town, peer behavior was a significant predictor of heavy drinking by an adolescent. Peer use explained the variance in illegal substance use of adolescents in Durban and Capetown (Brooks et al, 2006). Male and female adolescents report same-sex peer pressure to

become sexually active (Buga, Amoko, & Ncayiyana, 1996) and perceived peer drug use, as well as bravado among males, has been shown to influence both individual substance use and sexual behaviors such as lack of condom use and multiple partners (Morojele, Kachieng'a, Mokoko et al., 2006). Females were influenced by their inability to refuse their partners for fear of rejection or partner violence. Beliefs and misconceptions held by peers, about sexuality (the necessity of sex to show love, girls liking violence, girls not really meaning what they say) have been associated with experiences of forced sex or sexual violence (Simbayi, Kalichman, Jooste, Mathiti, Cain, & Cherry, 2006; Weiss, Maman, Lary, Mbwambo, & McCauley, 2004). While peer pressure appears to impact both males and females, male adolescents are more likely to be influenced (MacPhail & Campbell, 2001). Positive influences of peers have also been noted whereby examples set by friends can promote safer sexual behavior (Perkel, Strebel, & Joubert, 1991).

Parents and families

Parents and families make a large contribution in prevention of high risk behaviors in teenagers, including providing attachment, monitoring, and communication, although much of the research was done in developed countries (Perrino, Gonzalez-Soldevilla, Pantin et al., 2000). Romer et al (1999) found that teens living in high poverty areas (in the US) who reported high levels of parental monitoring were less likely to initiate sexual activity at earlier ages. In addition, parental attachment and communication has been positively related to consistent condom use (Perrino, Gonzalez-Soldevilla, Pantin et al., 2000; Romer, Stanton, Galbraith, Feigelman, Black, & Xiaoming, 1999). DiClemente et al (2001) found that parental monitoring was positively related to condom use and negatively related to marijuana use and alcohol consumption in African American female adolescents. These findings of parental influence have been noted in

other investigations which looked at sexual risk taking, drug use, and delaying of drug experimentation (Chilcoat & Anthony, 1996; Xiaoming, Susan, & Bonita, 2000). Parents also model behavior and parental substance use has been implicated in adolescent experimentation (Windle & Windle, 2003).

Studies done in sub-Saharan African countries have similarly shown that parents influence adolescent risk behaviors. The positive effect of family communication on condom use was noted by a study done with high school adolescents in Ghana, indicating that this protective factor does not only operate in western countries (Adu Mireku, 2003). Unfortunately at times, if parental communication only constitutes censure and punishment, it is not protective (MacPhail & Campbell, 2001). Tambashe and Shapiro (1996) note that in traditional African families, mothers are most likely to influence daughters' sexual practices and lack of maternal supervision can increase the odds of early sexual activity. Parental substance use has also been found to increase use by the adolescent in South African studies, much as was noted in western studies (Brook, Morojele, Pahl, & Brook, 2006). While parental or familial monitoring and communication have been shown to be influential in sexual initiation and condom use by African as well as western adolescents, these factors have not been specifically explored in relationship to multiple partnerships or to sexual violence.

Socioeconomics have been implicated in adolescent risk behaviors (Laga, Alary, Nzila, Manoka, Tuliza, Behets et al., 1994; Parry, 1998; Silberschmidt & Rasch, 2001). Income and the socioeconomic status of adolescents are usually related to parental and household (which may include extended family) resources. Drug use has been associated with lower family income and low income communities (Parry, 1998). Income related pressures have also been shown to increase the likelihood of transactional relationships among youth, especially women (Laga, Alary, Nzila et al., 1994; Pettifor, Measham, Rees, & Padian, 2004; Silberschmidt & Rasch, 2001)

and sex under these circumstances often occurs without use of a condom. Family resources may also impact whether an adolescent is able to remain in school and transactional sex may occur for school fees (Dunkle, Jewkes, Nduna, Jama, Levin, Sikweyiya et al., 2007). On the other hand, findings indicate that status and a desire for gifts which a girl cannot afford, rather than money for life necessities, may also drive transactional sex (Kelly & Parker, 2000; MacPhail & Campbell, 2001).

Schools and school environment

Education is a means of advancement, a source of accurate health information, and a place where support from other adults may be found (Dias, 2007). It would therefore be expected that remaining in school is an asset to an adolescent. Knowledge of HIV/AIDS has been shown to be positively associated with education and schooling (Gregson, Zhuwau, Anderson, & Chandiwana, 1998) and remaining in school has been associated with reduced sexual initiation, especially among girls (Tambashe & Shapiro, 1996) while completing at least 12 years of schooling was positively associated with condom use by male youth (Kaufman, Clark, Manzini, & May, 2004). Flisher et al (2003) found that repeating a grade, as well as absenteeism, was associated with alcohol use among Cape Town high school students and leaving school altogether (drop out) has been associated with an increased likelihood of binge drinking (Parry, 1998). In addition, a US study looked at school "connectedness", finding that adolescents who feel like they are part of their school and cared for by teachers and staff, were less likely to use substances or have an early sexual debut (McNeely, Nonnemaker, & Blum, 2002). Time spent at school is also protective to because an adolescent in school is occupied in an environment where s/he is not likely to engage in risky behavior (Kaufman, Clark, Manzini et al., 2004). The concern is the time after school, or adolescents who are not in school.

These studies point largely to the protective effect of schooling for both substance use and sexual risk behaviors, although the actual mechanism by which this occurs is not clear and not much research has been done on the association between schooling and multiple partnerships. Schools are a primary source of peer interaction and the peers a teen interacts with in school may be one of those mechanisms. Schools can also be a place of contact and mentoring from non-familial adults, which might also positively influence adolescent behavior.

Community factors

Factors associated with the larger community can influence adolescent behavior and, even though they are more distal, may be particularly important in an African context where the larger community plays a significant role in the life of children and adolescents (Nsamenang, 2002). These include involvement with non-parental adults, involvement in community organizations, and attributes of the community or neighborhood environment, (Blum, 2004; Fergus & Zimmerman, 2005; Kotchick, Shaffer, Forehand, & Miller, 2001; Magnani, Karim, Weiss, Bond, Lemba, & Morgan, 2002).

Teens benefit from contact and interaction with non-parental adults. These adults can provide role models and can have a positive influence in decreasing adolescent risk behaviors (Vesely, Wyatt, Oman, Aspy, Kegler, Rodine et al., 2004). In a US study, adult mentors reduced both illegal drug use and relationships with multiple partners among adolescents (Beier, Rosenfeld, Spitalny, Zansky, & Bontempo, 2000). Behavior of other members of the community can also influence an adolescent, particularly related to substance use. Parry et al., (2004) found that exposure to drunkenness by members of the neighborhood highly predicted the likelihood of an adolescent drinking heavily. They also found that attending "rave" parties, or nightclubs, where many people are likely to be drinking or using drugs, was associated with both alcohol and

drug use. Youth may attend those parties and be more likely to drink or use drugs, but they may also go *because* they know that the parties will provide them access to alcohol and drugs. Neighborhood influence may be related to the influence of community norms and to the availability of substances in a community. Among Cape Peninsula adolescents while marijuana use was related to behaviors of peers and individuals, it also was related to community factors such as perceived attachment to the neighborhood, transition, laws favorable (or not) to drugs, perceived availability of drugs, and rewards for conventional involvement (Morojele, Kachieng'a, Mokoko et al., 2006).

Urban versus rural location may also impact behavior. Flisher et al (2003) note that the longer an adolescent has lived in an urban region, the more likely he or she is to use substances, which may be related to learned access and availability. In addition, ready availability of drugs and witnessing community violence is strongly associated with an increased likelihood of adolescent victimization, including various forms of violence (Morojele, Kachieng'a, Mokoko et al., 2006).

Religiosity or involvement in faith communities or youth groups has not always been studied, and where it has, has not consistently predicted risk behavior. Nicholas and Durheim (1995) found that religious college youth in South Africa were more likely to postpone sexual activity and have fewer partners, and a study with young women in Kinshasa found that religion influenced both initiation of sexual activity and age at first pregnancy (Tambashe & Shapiro, 1996). On the other hand, Zambuko et al, (2005) reviewing data from surveys done in Durban and Kwa-Zulu Natal between 1999 and 2000, did not find that religion predicted initiation of sex or condom use. Involvement with community sports programs has been shown to reduce sexual activity among females but not among males (Kaufman, Clark, Manzini et al., 2004). However, religious communities, as well as youth organizations, can be both sources of mentors

for youth and sources of health information, they are important to remember in consideration of adolescent risk behaviors.

Vulnerabilities of orphaned youth

Orphaned adolescents have experienced a life-altering event and many begin to experience distressed home lives when one or both parents become ill which continues until one or both parents die (Andrews, Skinner, & Zuma, 2006; Horizons, 2005). While there have been limited numbers of studies of the effect of parental loss on risk taking in adolescents, there is a large body of knowledge on the emotional effect of parental loss in this population. Most of the studies done on the effect of parental loss on adolescents have been clinical, done in the US or Western Europe and point to negative emotional or psychological outcomes. These include major depression, lower school performance and aspirations, conduct disorders, anxiety, lowered self esteem, and aggressive or attention seeking behaviors (Cluver, Gardner, & Operario, 2007; Forsyth, Damour, Nagler, & Adnopoz, 1996; Lutzke, Ayers, Sandler, & Barr, 1997; Reinherz, Giaconia, Pakiz, Silverman, Frost, & Lefkowitz, 1993).

Studying children who lived in high stress family circumstances in the United States, where households were potentially chaotic, resources limited, and parents not always emotionally available, Rutter (1990) found that children are affected not only by particular stressful circumstances but also by chronic exposure to stress. It can be argued that orphaned adolescents have often been exposed to chronic stress which comes not just from the death of a parent but from, perhaps years of, living with a progressively more ill parent (Foster & Williamson, 2000). Stress may also be related to stigma, due to altered living circumstances and having to leave school, or perceived stigma which may lead the orphaned teen to leave school and become isolated (Foster, Shakespeare, Chinemana, Jackson, Gregson, Marange et al., 1995; Foster &

Williamson, 2000; Sengendo & Nambi, 1997). Depression, stress, anxiety, and reduced self-esteem are individual factors, shown to be associated with risk taking and the absence of parental monitoring and protection is likely to increase the potential for risky behaviors.

Resources and the effect on schooling

One of the concerns for orphaned adolescents has been that limited resources and increased household responsibilities might cause adolescents to drop out of school earlier, further decreasing potential protective factors for this population. Some studies had found limited differences for orphans compared with non-orphans when it came to educational opportunities, pointing instead to poverty and income as the main source of disparity (Foster, Shakespeare, Chinemana et al., 1995; Lloyd & Blanc, 1996). Other more recent studies, concentrated in sub-Saharan Africa, found not only that orphans are at significant risk of lower school enrollment (Case & Ardington, 2006; Case, Paxson, & Ableidinger, 2004; Foster & Williamson, 2000), or school completion (Operario, Cluver, Rees, MacPhail, & Pettifor, 2008), but that this risk is present even when relative poverty is controlled for (Case, Paxson, & Ableidinger, 2004). Nyamukapa et al., (2003) point out that orphans were found disproportionately in rural, female-, adolescent-, or elderly-headed families in Zimbabwe; all of which are risk factors for poverty. In addition, adolescents may be more likely to have to leave school to care for other children or family members, especially upon the death of a mother. Two studies have found particular vulnerabilities for maternal orphans when it came to school enrollment and attendance (Case & Ardington, 2006; Gregson, Nyamukapa, Garnett, Wambe, Lewis, Mason et al., 2005). Little is written about the peer relationships of orphaned youth, but it is likely that adolescents who are not in school may be associating with other out of school youth, who are also missing the protection conferred by being in school.

Extended families and communities

As parents die, the expectation in most societies is that other family or the community will take over care of children and adolescents and provide the protections that they need. Nsamenang, (2002) writing about adolescence in sub-Saharan Africa makes the point that "family" for Africans includes many more people than those in the nuclear unit, creating dense social networks. In fact, early in the AIDS crisis, some studies done in Africa indicated that there was little difference between orphans and non-orphans because orphans were generally well looked after in the community (Bicego, Rutstein, & Johnson, 2003; Kamali, Seeley, Nunn, Kengeya-Kayondo, Ruberantwari, & Mulder, 1996). However, as more orphans were absorbed into extended families, and HIV/AIDS began to affect more adults resulting in multiple ill family members and more orphaned children, extended family networks were stretched, financially and emotionally. They became less able to provide the support and structure needed by children and adolescents (Bicego, Rutstein, & Johnson, 2003; Foster & Williamson, 2000) . A household where a member dies of HIV is often financially stressed before the death and becomes more so afterwards, raising concerns about the pressure on orphaned adolescent girls to engage in transactional sex (Foster & Williamson, 2000; Luke, 2005; UNICEF, 2004). In addition, some studies point out that orphaned children have better outcomes if they are living with certain relatives. This has largely been considered in the case of schooling as an outcome. Case et al, (2004) and Nyamakupa et al, (2005) both found that orphans living in female-headed households or with grandparents, were more likely to remain in school or have school completion regardless of household income, compared with orphans living with other relatives.

Behavioral responses to parental death

It is apparent that a number of factors which might impact the risk behaviors of adolescents are enhanced among orphaned adolescents. However, until recently few studies had actually compared orphaned and non-orphaned adolescents' risk behaviors. These studies, conducted in a number of different countries and regions in sub-Saharan Africa point largely to enhanced risk for orphaned youth but the particular outcomes are not consistent.

The earliest study comes from Zaire where Tambashe and Shapiro (1996) analyzed data from a sample of 2400, 13-49 year old women and found that double orphans were more likely to initiate sexual activity while maternal orphans were more likely to have an early first pregnancy. These findings of earlier sexual debut among orphaned adolescents compared with non-orphans have also been found by researchers in South Africa, (Hallman, 2004; Operario, Pettifor, Cluver, MacPhail, & Rees, 2007; Thurman, Brown, Richter, Maharaj, & Magnani, 2006) and Zimbabwe (Gregson, Nyamukapa, Garnett et al., 2005; Kang, Dunbar, Laver, & Padian, 2008). Other behaviors where orphans were found to be at enhanced risk, compared with non-orphans include less secondary abstinence (Hallman, 2004; Tambashe & Shapiro, 1996), increased age partner difference(Hallman, 2004), multiple partners or concurrent partners (Kang, Dunbar, Laver et al., 2008), and HIV infection (Gregson, Nyamukapa, Garnett et al., 2005; Kang, Dunbar, Laver et al., 2008; Operario, Pettifor, Cluver et al., 2007).

However the studies look at different types of orphans and most compare orphans with non-orphans, without consideration of subgroups. Those which have looked at sub-groups of orphans have found enhanced risk for different subgroups including double orphans (Tambashe & Shapiro, 1996), paternal orphans (Hallman, 2004), and maternal orphans (Gregson, Nyamukapa, Garnett et al., 2005; Hallman, 2004; Kang, Dunbar, Laver et al., 2008; Tambashe &

Shapiro, 1996) compared with non-orphans. Maternal orphanhood appears to consistently convey greater risk than paternal or double orphanhood, in most studies.

Studies of the association between orphan status, behavioral risks, and poor outcomes are not consistent. Tambashe and Shapiro (1996) found that paternal and maternal orphans were *less* likely to initiate sexual activity compared with non-orphans. Other researchers found that condom use or the numbers of sexual partners did not differ between orphans and non-orphans(Gregson, Nyamukapa, Garnett et al., 2005; Hallman, 2004; Operario, Pettifor, Cluver et al., 2007; Thurman, Brown, Richter et al., 2006). Operario et al. (2007), Gregson et al. (2005) and Kang et al. (2008) found no significant association between male orphan status and HIV infection.

The variations in findings may be related to differences in contextual circumstances of orphans in the varied regions where they were studied, differing control variables in the studies, and different age groups and genders being studied. Or it may be that factors apart from orphanhood have a greater influence on certain behavioral outcomes.

Research Gaps and significance of this study:

While studies have been done on substance use in South Africa, recent studies have either focused on particular regions or have come from research groups such as the South African Community Epidemiological Network on Drug Use (SACENDU), which monitors sentinel sites in a number of urban and rural locations and gathers data from partner organizations. Most are not national, do not focus on adolescents or do not examine factors associated with risk behaviors from a variety of domains which have been shown to influence adolescents (Madu & Matla, 2003; Parry, Bhana, Pluddemann et al., 2002; Parry, Carney, Peterson et al., 2007; Shisana, Rehle, Simbayi et al., 2005). None considered the relationship

between orphaned youth and substance use. Despite the documented association between substance use and sexual risk behaviors, most of the studies have included adult subjects, recruited from convenience samples, or drawn from very specific venues such as schools or drinking establishments. The studies looking at orphaned youth and sexual risk behaviors have usually also involved smaller populations and most have not included sub-groups of orphans. Apart from studies done by Hallman (2004), Operario et al, (2007), and Thurman et al. (2007), none of the studies on orphaned youth were done in South Africa and none controlled for substance use, as well as other proximal and distal factors, in assessing the relationship to risky sexual behavior.

Theoretical framework

The theoretical framework which informs both papers for this study draws from a number of theories. These theories recognize that risk behaviors for adolescents are likely not only a result or outcome of individual factors, but also include factors related to families and the communities in which they live (Boerma & Weir, 2005; DiClemente, Salazar, Crosby, & Rosenthal, 2005).

Primary Socialization Theory has been used to consider substance use among adolescents in the United States (Oetting & Donnermeyer, 1998). This theory acknowledges that in every society or culture specific primary sources for socialization develop which influence the behavior of children and adolescents. Secondary socialization sources influence behavior through the primary sources. In adolescence, while families continue to be influential, a major influence on behavior comes from peer relationships. The theory postulates that the relationships between families, schools, and peers form a potentially protective element for adolescents, as long they are intact (Figure 1.1). Strong family bonds and strong associations

with schools contribute to bonds with peers which are positive. On the other hand weakened family or school bonds can lead to association with deviant peers which are a significant influence on adolescent substance use. Strong family and school bonds can also moderate association with deviant peers. Family bonds include monitoring, supervision, involvement in the life of the child/adolescent. School bonds include continuing education but also connectedness with schools as evidenced by liking school and anticipating school success. These factors may be particularly important for orphaned youth where both family and school bonds are likely to be weakened due to parental death.

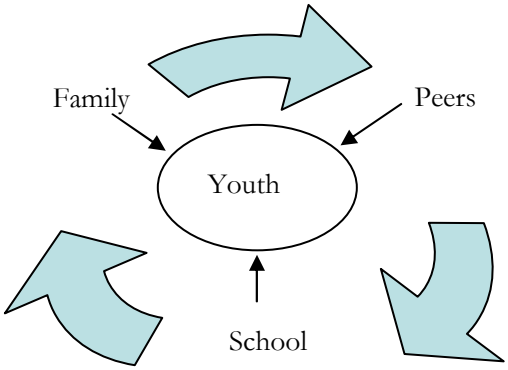

Figure 1.1 The relationship of families, peers, schools and their influence on youth from Primary Socialization Theory

The theory also acknowledges that factors such as religion, media, socio-economics and communal living factors are important, but only in so far as they influence adolescents' relationships with schools, families, and peers. Personal characteristics such as self esteem, anxiety, alienation or depression are thought to contribute to anger, sensation seeking, or acceptance which in turn can influence the "friends" or peers with whom an adolescent associates. Participation with deviant peers or internalization of deviant norms is thought to further limit the bonds with family or with schools, if those bonds are already weakened.

Primary Socialization Theory has not been tested in an African context or with orphaned adolescents. While individual characteristics may be related to behavior through peer, parental, or school norms, orphaned adolescents in sub-Saharan Africa experience a great deal of stress and stigma (Cluver, Gardner, & Operario, 2007, 2008). They may need to draw on external, communal resources, as well as internal ones, to protect them against stress.

Social Cognitive Theory (Bandura, 2001; Baranowski, Perry, & Parcel, 2002) also considers interactions between behavior and environmental influences, but adds some constructs that focus on individual strengths such as self-efficacy, self-control, and knowledge. Self efficacy includes confidence in performance of a behavior and has been found to be significantly associated with sexual risk behaviors such as condom use in the US (Dilorio, Dudley, Soet, Watkins, & Maibach, 2000). Self-efficacy is expected to influence a person's intent or desire to gain knowledge as well as influencing intent and motivation for behavior (Bandura, 1997; Baranowski, Perry, & Parcel, 2002). Knowledge alone may not be sufficient to motivate behavior but is still a factor in behavioral decisions. Self-control is actually oriented towards goal-setting such that personal evaluation of behavior is made and used in evaluation of personal goals. "Observational learning" and "outcome expectations" are important factors in Social Cognitive theories which imply that individuals learn behaviors through their associations with any number of people, including parents, peers, or other adults in their lives. That behavior is either positively or negatively reinforced based on the expectation that they have regarding the outcome of that behavior. Negative parental reaction to certain behaviors may, therefore, reduce certain behaviors in children and adolescents while significantly positive responses from peers may enhance or reinforce those behaviors.

As has been stated before, "family" may need to be understood somewhat differently in an African context, which acknowledges relational and interdependent notions of individuality

and where "family" includes adults who may be more distally related but who influence the upbringing and well-being of an adolescent (Nsamenang, 2002). This is true for all children and youth, not just orphaned ones. Morojele et al (2002) studying adolescents in South Africa emphasize the importance of factors related to the community in which adolescents live in shaping adolescent behavior. Community based factors may not only provide opportunities for involvement in conventional activities, but also opportunities for "observational learning", which may be particularly important in the lives of adolescents who are not as connected to families or to schools. These may include perceptions of connectedness and safety in a community, access to resources and/or the opportunity for involvement with other adults through youth and religious organizations. Again, in the absence of parental guidance, these factors may be particularly significant for orphaned youth.

In summary, the aims for this dissertation will be informed by constructs which include a number of domains including individual, family, peer, school, as well as community. Including these five domains has not been done when considering behavioral outcomes of South African adolescents (Figure 1.2).

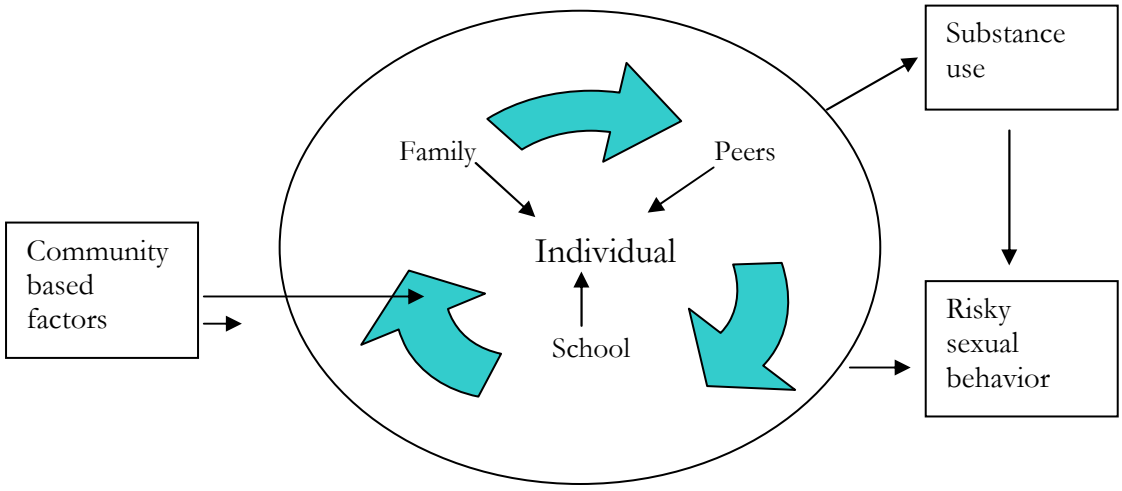

Figure 1.2 Combining constructs from Primary Socialization Theory and from Social Cognitive Theories with a Community domain added

Aims and Hypotheses

Study sample

The present study draws on data from a large national survey of youth (ages 15-24) done in South Africa in 2003 (Pettifor, Rees, Steffenson, Hlongwa-Madikizela, MacPhail, Vermaak et al., 2004) which included information on reproductive health and substance use behaviors as well as information on whether parents are living or not, for all survey participants. The aims are to examine, in two papers: 1) the relationship between orphanhood as well as factors from individual, family, peer, school, and communal domains on substance use among adolescents and 2) the relationship between substance use and domains on sexual risk behaviors. Tables 2.1 and 3.1 contain descriptions of variables included in each analysis.

Aim 1

To determine the prevalence of substance (drug and alcohol) use among 15-24 year old South African male and female youth, to examine factors associated with substance use among these adolescents, and to determine if orphaned adolescents are at greater risk of alcohol or drug use, compared with non-orphaned adolescents. The associations are to be measured with three outcomes of youth ever having drunk alcohol, ever having used illegal drugs, or having been drunk in the previous month.

Hypotheses:

Orphaned youth are expected to be at increased risk of substance use because the bonds of schools, peers, families, and community are likely to have been disrupted. While the peer questions in the survey are mostly directed at information on reproductive health behavior, peer

influences have been particularly studied in relationship to substance use in Primary Socialization Theory. It is likely that youth who feel either connected to peers or feel pressured by peers (even about sexual matters) are likely to be influenced by those peers. The community domain is also expected to be associated with substance use in that it provides both venues for risky activity and also opportunities, through youth groups and faith communities, for more protected environments.

- Orphaned youth are expected to be more likely to use either alcohol or drugs and to have been drunk in the previous month, compared with non-orphaned youth.
- Males are expected to have used substances more than females
- Domains, apart from the individual domain, but including the peer and community domain, are expected to be significantly associated with substance use, for both male and female youth.

Aim 2

To examine the association between substance use and sexual risk behaviors among (single, sexually active) 15-24 year old South African youth, having controlled for substance use, to determine if orphaned youth are more likely to engage in risky sexual behavior (compared with non-orphaned youth) and if factors beyond individual ones are associated with sexually risk behavior among youth. The associations were measured with the outcomes of having had more than one life time partner (versus only one) and having used condoms regularly (more than 50% of the time) with up to three partners in the previous month. For the outcome of multiple partners, substance use was defined as youth ever having drunk alcohol or ever having used drugs, and for the outcome of regular condom use as youth having used alcohol or drugs, or having been drunk, in the previous month.

Hypotheses:

Substance use is expected to enhance the likelihood of both multiple partners and irregular condom use. This association is likely to be influenced especially by individual, school, and family factors. Family supervision and monitoring should reduce risky behavior but may also enhance an adolescents' sense of protection and life options. School factors are expected to influence knowledge, as well as a sense of future options. It is expected that youth who have hopes for their future and a sense of control may drink responsibly, even if they do drink, and are less likely to engage in illegal drug use will engage with fewer partners and use condoms more regularly. Orphaned youth, having had significant disruptions in family, and potentially also school and community relationships, are hypothesized to be more likely to engage in risky sexual behavior, even when substance use is controlled for.

- Substance use (especially alcohol use in the previous month and drug use in the previous month) is expected to be associated with both having had multiple partners and irregular condom use
- Having controlled for substance use, orphaned youth are still expected to be more likely to engage in risky sexual behavior.
- The individual, family, and school domains are expected to be most influential in both sexual risk behaviors

Chapter 2

Substance use among orphaned and non-orphaned youth in South Africa

Introduction

Substance use, including alcohol and illegal drugs, is on the rise in sub-Saharan countries such as South Africa (Parry, Myers, Morojele et al., 2004). Along with HIV, substance use has become a major health concern for adolescents. Fifty percent of 15-24 year old South African youth report having consumed alcohol, while 11% report having used illegal drugs (Pettifor, Rees, Steffenson et al., 2004).

Alcohol and drug use can result in lifelong addiction which impacts an adolescent's life opportunities. Injected drug use is associated with viral transmission via needle sharing and all substances have been associated with enhanced sexual risk taking and increased risk of sexually transmitted infections such as HIV (DiClemente & Crosby, 2003). As 29.4 million people living in Africa are infected with HIV, and youth in sub-Saharan Africa have the highest rates of HIV infection in the world, this represents a serious health burden (UNICEF, 2005).

Adding to the social and health burden is an ongoing orphan crisis. It has been estimated that there were over 3 million orphaned children and adolescents living in South Africa in 2007 (Meintjes, 2009). While all adolescents are prone to high risk behavior, related to their life stage (Call, Riedell, Hein et al., 2002), the millions of orphaned adolescents may be particularly vulnerable to substance use, and to associated morbidities, including HIV infection due to parental absence and potentially altered living circumstances (UNICEF, 2005).

While studies on substance use in South Africa have been conducted, recent studies have either focused on specific regions of the country, or have come from research groups operating in key urban and rural sentinel sites (such as SACENDU-- the South African Community Epidemiological Network on Drug Use). Most are not national, do not focus on risk to adolescents or do not examine both proximal and distal factors which have been shown to influence adolescents (Parry, Bhana, Pluddemann et al., 2002; Parry, Carney, Peterson et al., 2007; Shisana, Rehle, Simbayi, Parker, Zuma, Bhana et al., 2008). None have looked for any enhanced risk to orphaned youth.

Substance Use among South African Youth

The main data on substance use of South African youth come from a few sources: a study of black youth completed in 1994 (Rocha-Silva, 1996) an analysis based on 1998 Demographic Health Survey data (Parry, Pluddemann, Steyn, Bradshaw, Norman, & Laubscher, 2005) or studies done as part of SACENDU looking, over time, at 8th and 11th grade students in Cape Town (Parry, Bhana, Pluddemann et al., 2002). Other data have been obtained from two national HIV surveys-- HIV and Sexual Behaviour Among Young South Africans, a national survey of 15-24 year olds from 2003 (Pettifor, Rees, Steffenson et al., 2004) and the South African National HIV Prevalence survey from 2005 and 2008 (Shisana, Rehle, Simbayi et al., 2005, 2008) and from several smaller studies focused on specific regions of the country.

While drinking occurs among both males and females and among all races, white males are most likely to drink (Pettifor, Rees, Steffenson et al., 2004; Shisana, Rehle, Simbayi et al., 2005). However, alcohol was also found to be a mechanism of entry into adulthood for black males (Rocha-Silva, 1996) and used mostly in the company of friends for enjoyment, although there was also perceived peer pressure to drink. Shisana et al. (2005) note that, based on an

Alcohol Use Disorder Identification Score (AUDIT), while white males are most likely to drink, they are also more likely to be "low risk" rather than "high risk" drinkers (low risk scores were those identifying drinking within medical and legal guidelines versus high risk scores which identified drinking done in a hazardous or harmful manner). The group found to be least exposed to alcohol were black females compared with males, colored or white females (Flisher, Parry, Evans et al., 2003; Flisher, Ziervogel, & Chalton, 1993; Rocha-Silva, 1996)

Less is known about drug use. Reported prevalence of drug use (injected and not injected) among adolescents range from 7% (Flisher, Parry, Evans et al., 2003) to 20% (Madu & Matla, 2003). Alcohol is often the entry point to drug use (Flisher, Ziervogel, & Chalton, 1993; Rocha-Silva, 1996) and there appears to be a rise in the use of all drugs, including the use of injected drugs (Parry, Myers, Morojele et al., 2004; Shisana, Rehle, Simbayi et al., 2008). Increasing age has been associated with greater use of both alcohol and drugs (Flisher, Parry, Evans et al., 2003; Shisana, Rehle, Simbayi et al., 2008).

While injected drug use may be on the rise, sexual transmission remains the main pathway to HIV infection in sub-Saharan Africa. Substance use among youth (not only South African youth) is also of concern because it has been associated with inconsistent condom use or unprotected sex (Kebede, Alem, Mitike et al., 2005; Palen, Smith, Flisher et al., 2006) and casual and transactional sex (Mataure, McFarland, Fritz et al., 2002).

Factors influencing substance use in South African youth

What leads an adolescent to use substances or engage in risky behavior in the first place? And what are the factors which might either increase or decrease the probability of that engagement? We have limited knowledge of the pathways that lead South African youth to use alcohol or drugs.

Primary Socialization theory, focusing on the influence of peers, schools, and parents on individuals, has been used to consider substance use among adolescents in the US (Oetting & Donnermeyer, 1998) and Social Cognitive theories have identified individual and inter-personal constructs associated with risky behavior, mostly in Western countries (Bandura, 2001; Blum & Mmari, 2005; Eaton, Flisher, & Aarø, 2003). However, we do not know if constructs from all domains influence substance use behavior or if they are operational in an African context.

Are orphaned youth at enhanced risk?

A concern which has been expressed for some time is the potential increased vulnerability of orphaned youth to risky behavior ((UNICEF, 2005). We know that factors which are present in circumstances of parental loss such as stress, anxiety, lack of controls, lack of support, and absence of role models influence certain risky behaviors in adolescents (Cluver, Gardner, & Operario, 2007; Perrino, Gonzalez-Soldevilla, Pantin et al., 2000). However, to date there are no studies documenting altered risk of orphaned South African youth to substance use.

The aim of this study was to examine the influence of factors from five domains (individual, family, peer, school, and communal) on substance use among adolescents in South Africa. In addition, we considered whether orphaned, compared with non-orphaned, youth are at increased risk of substance use.

Methods

Data for this study came from a survey of South African youth ages 15 to 24 conducted in 2003, with a systematic, stratified national sampling of households across nine provinces. Enumeration areas, from the 2001 census, were used as the primary sampling units and randomly selected segments of each enumeration area were chosen wherein all households were

visited. One eligible youth per household was randomly selected to participate. All participants were asked to complete a comprehensive questionnaire on sexual risk behaviors and attitudes, which also included questions regarding substance use, family composition, educational attainment, school and peer influence, and community characteristics. All participants provided informed consent and guardians provided consent for those under age 18 (see Pettifor, Rees, Steffenson et al (2004) for a more detailed description of the survey and methodology).

A total of 15,414 enumerated households contained an eligible youth. Of those eligible, 12.6% refused, 9.8% were not found at home after three repeat visits, and for 58 subjects there were errors made in the interview or saliva collection, resulting in 11,904 interviews (77.2%) completed. Interviewers were matched to participants' gender, race, and language. Questionnaires were translated and back translated from English into eight South African languages. All procedures were approved by the Committee for the Protection of Human Subjects, University of the Witwatersrand, South Africa (Pettifor, Rees, Steffenson et al., 2004).

Conceptual Model

The theoretical framework informing this research utilizes concepts and constructs from Primary Socialization and Social Cognitive theories (Bandura, 2001; Oetting & Donnermeyer, 1998). Primary Socialization theory postulates that while every culture and society has sources for socialization of children and adolescents, secondary socialization sources are an additional influence on behavior. Families, embedded in specific societies, provide primary influence. However peer relationships are significant, especially in adolescence. Bonds between families, schools and peers can provide protection for adolescents and curtail risky behavior. Strong family and school bonds contribute to positive peer bonds, while weak family and school bonds can lead to association with deviant peers. Important factors include family monitoring,

supervision, and involvement in the life of the child, continued education, and a sense of being connected to, and liking, school. Participation with deviant peers can in turn, weaken family and school influence.

Social Cognitive theory also acknowledges the connection between behavior and environment but adds constructs which focus on individual strengths such as self-efficacy, self-control, and outcome expectations. Self-efficacy is expected to influence a persons' intent to gain knowledge while self-control is oriented towards goal setting and self-evaluation. Observational learning and outcome expectations imply that individuals learn behavior through association with a variety of people, including parents and other adults and peers. Behavior is reduced or reinforced by the modeling, reactions, and responses of these people.

Research conducted with African youth, found non-familial adults to be significant influences in the lives of youth ((Morojele, Flisher, Muller et al., 2002) therefore variables associated with a community domain were also included in our analysis.

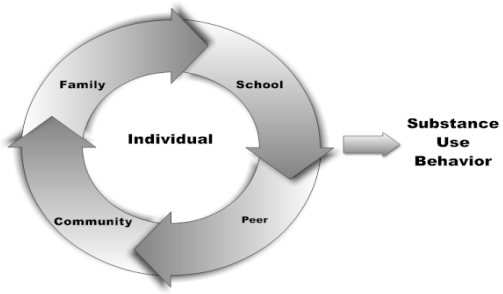

Figure 2.1 Conceptual model for youth substance use behavior

Measures

Outcome variables:

Three different outcome measures were examined: alcohol consumption, experience of drunkenness, and drug use. For alcohol use, subjects were asked if they had ever had a drink "except for religious reasons or to taste" and those who answered yes were asked how frequently (daily, weekly, monthly). While any alcohol consumption may be a problem for a 15 year old, consuming a few times a week, as long as it is not associated with multiple episodes of drunkenness, may not be problematic for 20-24 year olds. Preliminary analysis indicated that there was little difference between youth of various ages, or between orphaned versus non-orphaned youth, based on these differing frequencies of consumption. Therefore a dichotomous variable of *ever having drunk alcohol* versus never having drunk alcohol was generated. Those who admitted to drinking were then asked if they had been drunk in the previous month. A second variable was created comparing those who reported *having been drunk in the previous month* with all others (including those who had never consumed alcohol, had not consumed in the previous month, or had consumed but had not been drunk).

Drug use was based on a question which asked if the subject had ever used "any drug to make you feel high." Those who answered yes were considered to have *(ever) used drugs* and compared with those who said they had not.

Independent variables:

Orphan status: Orphan status was defined as "maternal orphan" (only mother has died), "paternal orphan" (only father has died), or "double orphan" (both parents have died). These were mutually exclusive categories. If the subject did not know if a parent was alive, the

parent was considered to have died, as the absence of any information on a parent indicates that the parent is not providing any emotional or financial support to the adolescent.

Domain variables: based on the theoretical framework and prior research, factors associated with individual, peer, school, family, and community domains were identified. A list of all the domain variables with descriptions can be found in Table 2.1.

Demographic variables*:* These included age (18-20 year olds and 21-24 year olds compared with 15-17 year olds , race (White, Coloured, or Indian, compared with Black) religion (Christian, Traditional, or "Other" compared with none), urban compared with rural residence, measures of household resources, and education of the father and mother (none or primary education compared with secondary). Household resources included not having electricity (versus having it) and having the walls of the house made of materials considered "traditional" or used for shacks, compared with permanent materials. In preliminary analysis there was little difference between traditional materials or shacks so these categories were collapsed and compared with materials used for a permanent home.

Data analysis

The analysis reported for this paper included all 11,904 subjects ages 15-24 and was stratified by gender. Stata 9.2 analysis software was employed using survey (*svy*) commands because of the complex design of the survey, with provinces designated as "strata" and enumeration areas as "primary sampling units". The sub-population option was used to analyze male versus female data separately. The final sample was weighted with population weights to represent the actual distribution of South African youth ages 15-24 for gender, age, race, province, and geography type, based on 2001 census reports.

Bivariate analyses were conducted with all independent variables and the three outcome variables. Multivariate modeling was then done using logistic regression. Separate regression models were fitted for each outcome (ever having drunk alcohol, having been drunk in the past month, and ever having used drugs) and stratified by gender. The models included all the variables in all domains, as well as demographic variables. The same independent variables were used for all the models.

Having "been drunk in the previous month" presumes that the subject has also consumed alcohol. As the independent variables in both models ("ever having drunk alcohol" and "having been drunk in the previous month") were the same, we were concerned that in the second model, our results reflect only the effect of variables on youth having been drunk, and not the combined effect of alcohol consumption as well as the experience of drunkenness. We therefore fit the model for alcohol consumption, obtained a variable containing the predicted probability of youth having consumed alcohol, and included that variable, as a control variable, in the model on youth having been drunk. Significant associations ($p<.05$) between the independent variables and the outcome of having been drunk was then interpreted as the effect of factors on the youth having been drunk, and not on the underlying condition of having consumed alcohol.

Results

Sample

The sample included 5,687 males and 6,217 females. About one third of the subjects, male and female, were orphaned. Paternal orphans made up the majority of all orphan sub-groups with 21% of all males and 22.5% of all females being paternal orphans (Figure 2.1).

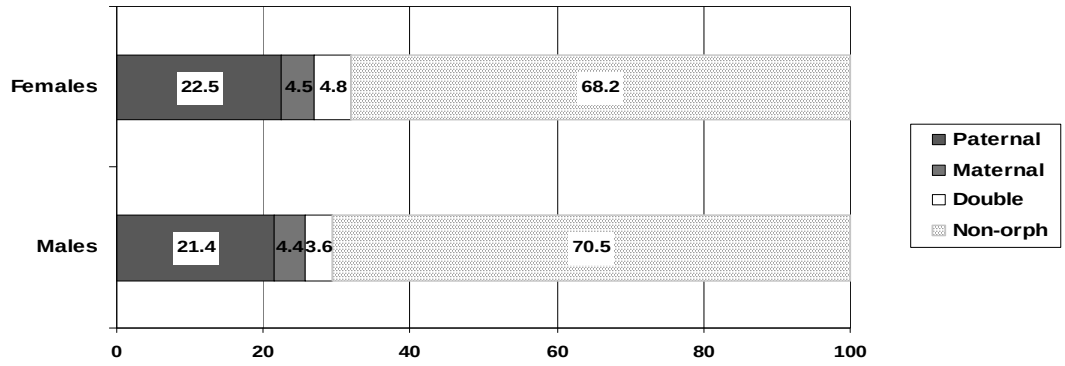

Figure 2.2 Distribution of male and female youth by orphan status

Description of sample: demographics characteristics

Overall substance use was not very high in this population. However, a significantly ($p<.05$) greater percentage of males (67%) compared with females (46%) had consumed alcohol and 32% of males had been drunk in the past month compared with 8.2% of females. Drug use was limited to 18% of males and 3% of females (Table 2.2). All further analysis was stratified by gender.

Males

Bivariate analysis (Table 2.2) indicated that larger percentages of older and white males had consumed alcohol. While 94% of white males and 83% of Colored males had drunk alcohol, 72% of Indian and 63% of Black males had. Additionally, while 79% of urban males had drunk alcohol, only 53% of those in rural households had. Males who lived in houses made of permanent materials, had electricity, or had mothers who had completed secondary school were also more likely to have consumed alcohol. Similar associations held true for males who'd been drunk in the previous month. However 48% of those who claimed no religious faith had been

drunk, compared with 28-30% of those who claimed Christian, traditional, or "other" religions. Males who used drugs were very similar to those who drank except that a larger percentage of those who claimed "other religions" (vs. Christian, traditional, or no religion) had used drugs.

Females

Larger percentages of White or Colored females had drunk alcohol (89% and 73%, respectively, compared with 58% of Indian and 40% of Black) and had been drunk in the previous month (Table 2.2). Alcohol consumption was also more likely among females who lived in urban locations or had more educated fathers. A larger percentage of those who were older, did not claim any religious faith, or lived in permanent homes with electricity had been drunk the previous month. Factors associated with females who used drugs were similar except that a significantly larger percentage ($p<.05$) of those whose mothers had *more* secondary education had used drugs.

In multivariate analysis, for both males and females, many of the demographic factors retained significance but were not associated as uniformly with all forms of substance use. None of the demographic factors remained significant for the experience of having been drunk for females (not shown).

Orphanhood:

We were interested in the association of orphanhood with substance use. While there were no statistically significant differences between orphans and non-orphans in bivariate analyses for males or females (Table 2.2), we found significant associations ($p<.05$) between male orphans and alcohol use and female orphans and drug use, in multivariate analysis (Table 2.3).

Once all other variables were controlled for, male paternal and double orphans were significantly more likely to have consumed alcohol, compared with non-orphans. Male maternal orphans were not different from non-orphans. These differences were not seen with the other outcomes for males. Controlling for the contribution of alcohol consumption, male paternal and double orphans, compared with non-orphans, were not more likely to have been drunk in the previous month. They were also not more likely to have used drugs.

Female paternal orphans had 70% greater odds of having used drugs compared with non-orphans, but there was no significant difference in having consumed alcohol or to have been drunk in the previous month. Female double and maternal orphans were also not different from non-orphans in their drug use.

Domains of influence

We found significant associations between substance use and factors from almost all domains in bivariate analysis (not shown) but fewer differences in multivariate analysis. The domains which were most influential were the individual and community domains for males and individual and family domains for females (see Table 2.3 for all multivariate results). Overall, more factors were significantly ($p<.05$) associated with substance use among males than among females.

Males:

Individual factors: Perceived vulnerability to HIV (compared with none) was associated with 1.5 to 2 fold greater odds of both alcohol consumption and drunkenness and perceiving small to moderate vulnerability was associated with youth who had 42% greater odds of having used

drugs. Having traveled out of town increased the odds of alcohol consumption and drunkenness but not drug use.

Peers: There were some scattered effects of peer variables in the regression models. Male youth who believed their peers were a good source of information about love were less likely to drink alcohol but there was no association with the experience of drunkenness or drug use. On the other hand, those who perceived peer pressure to have sex were more likely to use drugs. This peer pressure was not associated with an increased odds of alcohol consumption but was only marginally insignificant (p=.058) with the experience of having been drunk.

School: Only having completed some years of high school (8 or more), compared with having less than primary school education, was associated youth having 34% decreased odds of having been drunk and 44% decreased odds of having used drugs. There was no effect on alcohol use. Being unemployed (and not in school), compared with being employed, increased the odds of youth having used drugs.

Family: Once all variables were entered in regression models, the only family domain effect which remained significant for male youth was supervision. Males with family supervision had 23% reduced odds of having been drunk and 38% reduced odds of having used drugs. There was no effect on alcohol use.

Community: For males, regular attendance (weekly or more) at faith services was associated with 50-60% decreased odds of having consumed alcohol, having been drunk, or having used drugs. Attending street-parties, on the other hand, significantly increased the odds of all substance use outcomes for males.

Females

Individual factors: Controlling for all other factors, females who perceived themselves to be vulnerable to HIV (either small or moderate degree), compared with those who perceived no vulnerability, had 30 to 40% increased odds of having consumed alcohol. Females who felt greatly vulnerability to HIV had 35% increased odds of having consumed alcohol, 60% increased odds of having been drunk in the previous month, and more than 2 fold increased odds of ever having used drugs. Having traveled out of town in the previous six months (versus not) was associated with females who were more likely to drink alcohol or to use drugs, but there was no difference in the experience of having been drunk.

Peer: The only significant peer effect in regression models was that females who had spoken to friends about HIV had 95% greater odds of ever having used drugs.

School: No school variables were significantly associated with substance use for females, once all other variables were controlled for.

Family: A number of family variables predicted alcohol use and drug use for females, in multivariate regression. The odds of alcohol use were 46% less for females who had a curfew, compared with those who did not, and 22% less for those with family supervision (versus not). Females odds of drug use were also lower in the presence of family supervision. Having had communication about sexual pressure with family was again associated with reduced odds of having drunk alcohol, although it seemingly had no effect on experience of drunkenness or on drug use. Living with a guardian, rather than not, was associated with increased odds of alcohol use (but not with having been drunk or used drugs). This is likely related to the very large percentage of female youth (89%) who, regardless of age, stated that they lived with an adult guardian.

***Community*:** Controlling for all other factors, females who attended services weekly or more (rather than not at all) had reduced odds (54%) of having been drunk in the previous month. In addition, females who attended street parties even 1-2 times (versus not at all) had two to three fold greater odds of having consumed alcohol and those who had attended weekly or more (versus not at all) had more than 2 fold greater odds of having used drugs, and up to ten fold greater odds of having been drunk.

Discussion

The aim of this paper, informed by Primary Socialization and Social Cognitive theories, was to examine the influence of factors from five domains (individual, family, peer, school, and community) on substance use among adolescents in South Africa. We also were interested in determining whether orphaned youth were more likely to have drunk alcohol, been drunk in the previous month, or used drugs.

This analysis found paternal and double orphaned males to be at increased risk of alcohol use and paternally orphaned females to be at heightened risk of drug use, compared with non-orphaned males or females. There were significant gender and racial differences with white males and females at increased risk of having consumed alcohol compared with black youth, and all non-black racial groups having increased odds of drug use. The individual, family, and community domains were more influential than school and peer domains, in associations with substance use in this population.

Vulnerability of orphaned youth

A number of studies have pointed out the increased vulnerability of maternal orphans to sexual health risks (Gregson, Nyamukapa, Garnett et al., 2005; Kang, Dunbar, Laver et al., 2008) but there are also studies which point to vulnerability of paternal orphans (Hallman, 2004; Timaeus & Boler, 2007); and double orphans (Birdthistle, Floyd, Machingura, Mudziwapasi, Gregson, & Glynn, 2008; Monasch & Boerma, 2004). However, all of these studies were focused on reproductive health risks.

Loss of a father, (whether as a paternal or double orphan), can be expected to incur life change, stress, and anxiety through altered income and living circumstances and these factors are associated with increased substance use and risky sexual behavior in youth (Rocha-Silva, 1996; Weiser, Leiter, Heisler et al., 2006). Rocha Silva (1996) also found that alcohol consumption was a sign of entry into "manhood" for black males. The absence of a father to provide role modeling and help navigate that entry could contribute to enhanced substance use. We did not find any significant association between orphaned youth and having been drunk the previous month. However, there is room for concern in that even moderate amounts of drinking can reduce inhibitions and lead to other risk behaviors (Mpofu, Flisher, Bility et al., 2006).

The association between paternally orphaned females and drug use is likely also mediated by factors such as depression, anxiety, stress, and altered household income or living circumstances, although it is not clear why we only found females, and not males, to be at greater risk. The numbers of double and maternally orphaned females who admitted to drug use were too small to allow any additional associations to be apparent.

Individual Family and Community domains

Finding associations between individual factors and substance use among both males and females was not surprising, as we would expect the most proximal factors to be influential. What is interesting is the stronger association with family factors such as monitoring and supervision for females, compared with males; while males appeared to be more influenced by community, rather than family, factors. Although other studies have found that families and communities influence risky behavior in youth, they did not stratify their analysis by gender (Brook, Morojele, Pahl et al., 2006) or they focused on one gender (Adu Mireku, 2003; DiClemente, Wingood, Crosby, Sionean, Cobb, Harrington et al., 2001) which makes it difficult to note different associations for males and females.

Nsameneng (2002) writes on adolescence in sub-Saharan Africa and points to the traditional roles associated with family for girls. Other studies also found that family communication was influential for girls(Adu Mireku, 2003). Female youth are likely more responsible for caring for family members, more involved in household chores, and generally more tied to homes and families. They may also be supervised more closely than males are. It is perhaps not surprising that family influence is particularly important for females.

The effect of communities on males came through attendance of religious services and involvement with the high-risk venue of street parties. In both circumstances, males were placed in a context where non-family members were more likely to exert influence on them. Male youth are possibly less tied to families and household responsibilities and more able to participate in community activity. A much smaller percentage of males (46%), compared with females (66%) attended faith-related services weekly or more (not shown). It is likely that male youth who are active in faith communities are either inherently different from those who are not, or are more influenced by those communities in positive ways. As expected, attending street parties

increased risk for both males and females. A number of other South African studies have shown that attending "rave" parties, was associated with alcohol and drug use (Morojele, Kachieng'a, Mokoko et al., 2006; Parry, Morojele, Saban et al., 2004). There is likely a mutually reinforcing pattern whereby youth attend the parties and find themselves exposed to alcohol and drugs, or go *because* they know they will have access to substances. In either case, these venues promote a norm of substance use.

Peer and School domains

Based on our theoretical framework, we expected more significant findings associating factors in the peer and school domains with substance use. Dinges & Oetting, (1993) note that 90% of (American) youth who use substances have friends who use the same drugs and two studies done in South Africa, included variables from some of the same domains as we did, and also found peer influence to be important. Brook et al., (2006) considered a "family interactional perspective", including individual, peer, parental, and environmental factors such as SES and discrimination; while Morojele et al., (2002) included community, family, school, and a combined peer/individual domain and reduced each domain to one factor, utilizing principal components analysis. In both studies personal and peer factors were significantly associated with tobacco, alcohol, and drug use. However, the variables used were either associated specifically with behavior ("how many of your friends drink alcohol" or "how many have ever used illegal drugs"), or directly asked about rebelliousness, sensation-seeking, or rewards for anti-social behavior. It may be inaccurate to assume that questions which measure how much an adolescent values peer knowledge (such as our questions about whether peers are a teen's best source of information about sexual pressure) are also good measures of general peer influence on

substance use behavior. Modeling behavior of peers regarding substance use may be more important.

School variables were included in the study by Morojele et al., (2006) and also did not predict alcohol or drug use, but school factors have been shown to be protective in other studies done both in the United States (Reininger, Evans, Griffin, Sanderson, Vincent, Valois et al., 2005) and in South Africa (Flisher, Parry, Evans et al., 2003). Measures in these studies asked specifically about perceived school and teacher bonds and about grade repetition and absenteeism. Completion of schooling increases the chances of finding employment and easing family and financial obligations. Reduction of these stressors may reduce substance use, and we did find that males who had completed some high school were less likely to use drugs while those who were unemployed were more likely to.

Patterns of school attendance may alter the anticipated protection afforded by schooling through school connectedness. Both Flisher et al., (2003) and Operario et al., (2008) found South African youth to be hampered by grade repetition and slow academic progress. If time to school completion is extended over years, with multiple interruptions, it may not allow the formation of bonds with teachers or strong attachments to a school. Erratic school attendance may also alter how and where friendships and peer relationships are formed, with friendships potentially coming from a variety of higher risk venues rather than from schools.

Limitations

This study had some limitations. The cross-sectional design allows us to identify associations between factors and the substance use outcomes, but not to attribute causality. The data used were self-reported by adolescents and may have been hampered by under-reporting of risky behavior, particularly in regards to drug use. There is always an issue of temporality with

orphanhood, and there was no way to identify time of substance use vis-à-vis time of orphaning. Lastly, measures of alcohol use were measures of frequency (weekly, daily, or monthly use) rather than measures of quantity. We could not differentiate between heavy drinkers, who may be incurring greater risk, and lighter drinkers who may simply be drinking for social reasons. We were also limited in regards to more behavioral measurement of school connectedness and peer influence and were not able to measure factors such as stress and anxiety, which may play a role in orphan behavior. However, the data available had not been designed for this study in particular, and some compromises had to be made.

Conclusion

In this study, despite controlling for a wide array of factors, paternal and double orphaned males were at increased risk of alcohol use and paternally orphaned females were at increased risk of drug use, compared with non-orphaned males or females. This points to the value of considering type of orphaning, points to the ongoing need to determine the pathways that increase risk to orphans, and adds to literature that indicates the importance of paternal presence.

More precise measurements of family income and resources, as well as measures assessing how youth cope with stress and anxiety, would add needed information. Attention may also need to be paid to non-orphaned children and youth who do not reside with parents. In 2007, 40% of children in South Africa lived with their mothers in households where fathers were not resident (Meintjes, 2009). Non-resident fathers may or may not provide emotional and financial support and guidance to their children. We do not know if youth in these households are at the same risks as paternal orphans. Ongoing research is needed as programs may need to focus equally on adolescents and youth living without fathers.

We also found family and community factors, in addition to more proximal individual factors, were particularly influential in South African youth substance use. Additional information about family and neighborhood substance use norms would have added to our ability to assess the importance of these domains. While peer and school factors seemed not as significant, further research looking at how these factors and domains are measured in a sub-Saharan context, and what aspects of peer and school influence are measured so that they may be more directly related to the risk behavior of interest, would be helpful. Lastly, we continue to need studies exploring the causal pathways which link proximal factors with distal factors for all youth in the region.

Table 2.1 Description of variables included in domains for models examining substance use among South African youth

Domains	Variable Descriptions
Individual Domain	**Life control**: (binary) youth believes that he/she has control over what happens in life versus not believing he/she has life control **Life goals**: index 0-4 from 4 questions: Do you have long range goals? Do you believe you have opportunities? Do you know what you want from life? Do you know where you're headed in the future? Higher score implies youth know what they want from life and have life goals. **Perceived vulnerability to HIV**: (categorical): small/moderate vulnerability; great vulnerability versus no perceived vulnerability **Travel out of town:** (binary) youth has traveled out of town in last 6 months (for any reason) yes/no
Peer Domain	**Peers are the primary source of knowledge about love or romance** (binary): Youth identifies peers versus not identifying others as best sources **Peers are the best source of knowledge about how to handle sexual pressure** (binary): Youth identifies peers versus identifiying others **Have talked to peers about HIV** (binary- yes/no) **Perceived peer pressure to have sex** (binary- yes/no)
School Domain	**School completion** (years completed): completed primary school or . 8+ years (some high school) versus 0 to 6years (less than primary schooling) **Any post-high school** (binary): Any schooling beyond high school (includes technical, vocational, or university) versus no post-hs education **In school** (binary): Is youth currently in school? (yes/no) **Unemployed** (binary): Is youth currently unemployed? yes/no Does <u>not</u> include those who are unemployed because they are in school **School is the best source of HIV info** (binary): Identifies school/school personnel as best sources of info versus identifying others **Have talked to people in school about HIV** (binary yes/no)
Family Domain	**Guardian** (binary): youth lives with a guardian who is age 18 or older versus does not **Curfew** (binary): youth is expected home by a certain time in the evening (yes/no) **Supervision** (binary)**:** youth is expected to tell parent/guardian where they are going when they go out (yes/no) **Youth has talked to parents or guardians about HIV** (yes/no) **Youth has learned the most about HIV/AIDS from family members (parents, guardians, other relatives—does not include siblings, or spouses)** (binary) identifies family members as best sources of HIV info versus identifying others **Youth consider family members (defined as above) to be the best source of knowledge about love and romance** (binary) identifies family members as best sources of knowledge on love and romance versus identifying others **Youth consider family members (defined as above) to be the best source of knowledge about resisting sexual pressure** (binary) youth identifies family members as best sources of knowledge on sexual pressure versus identifying others
Community Domain	**Community closeness** (binary): perception that the community is very close based on whether people know and talk to each other vs. only somewhat or not close yes versus somewhat close/not close **Faith attendance** (categorical): Attends a faith-related services: weekly or more, 1-2 x per month up to 1-2 times per year versus not at all **Youth group** (binary): Attended a youth group (sports, music, theater) in the past month: 3-6+ times versus less often (or not at all) **Street party** (categorical): Attended a street party in the previous month: not at all, 1-2 times that month, a few times a week or daily

Table 2.2 Percent youth ages 15-24, who have ever drunk alcohol, been drunk in the previous month, or ever used drugs by orphan status and demographic characteristics *(weighted percents, unweighted frequencies)*

Total 11,904	Males *n=5,687*				Females *n=6,217*			
	Have drunk alcohol	Have been drunk	Have used drugs	*Total n's (male)*	Have drunk alcohol	Have been drunk	Have used drugs	*Total n's (female)*
Non-orphans	65.2%	31.8%	19.5%	*4070*	45.1%	8.9%	3.2%	*4412*
Orphans	71.2	33.4	16.3	*1614*	48.0	6.7%	2.8	*1803*
Paternal	70.7%	35.3%	16.1%	*1151*	45.3%	5.8%	3.4%	*1291*
Maternal	67.2	27.4	19.5	*280*	49.6	9.1	2.5	*298*
Double	78.5	29.5	13.3	*183*	59.3	8.4	0.3	*214*
Single	66.9%	32.2%	8.5%	*5642*	46.0%	8.3%	1.6%	*6016*
Married	71.4	39.4	18.6	*45*	46.2	5.5%	3.2	*201*
Age								
15-17	54.0% ***	17% ***	8.9% ***	*2090*	43.3%	5.4% ***	2.4%	*2266*
18-20	68.6 ***	34.4 ***	18.7 ***	*2030*	46.5	8.6 ***	3.4	*2073*
21-24	77.7 ***	44.7 ***	27.5 ***	*1566*	48.0	10.5 ***	3.5	*1878*
Race								
Black	62.6% ***	30.2%***	14.7% ***	*4690*	39.6% ***	5.9% ***	1.0% ***	*5177*
Coloured	83.3 ***	43.1 ***	32.8 ***	*643*	73.5 ***	21.2 ***	9.5 ***	*389*
White	94.3 ***	46.4 ***	39.7 ***	*224*	89.1 ***	20.8 ***	18.7 ***	*159*
Indian	71.7 ***	23 ***	33.9 ***	*130*	58.8 ***	8.1 ***	13.8 ***	*131*
Religion								
Christian	66.6%	30.8%***	17.5% ***	*4748*	46.3%	8.3 % *	2.9% ***	*5533*
Traditional	61.4	29.7 ***	17.2 ***	*223*	38.4	5.1 *	1.0 ***	*389*
Other	71.5	28.8 ***	35.5 ***	*179*	50.7	6.4 *	12.9 ***	*159*
No religion	70.8	48.5 ***	22.4 ***	*525*	52.5	18.1 *	6.0 ***	*131*
Residence								
Rural	52.9% ***	23.7%***	12.4% ***	*2717*	32.9% ***	3.4% ***	0.9 % ***	*3327*
Urban	78.7 ***	39.4 ***	23.6 ***	*2970*	56.2 ***	12.0 ***	4.9 ***	*2890*
Housing materials								
Permanent	70.1% ***	34.6%	19.5% *	*4443*	49.7%	10.2% ***	4.3% ***	*4486*
Traditional	53.6 ***	22	13.4 *	*888*	36.2	1.8 ***	0.8 ***	*957*
Shack/other	68.7 ***	35	20.6 *	*646*	42.3	8.2 ***	0.7 ***	*772*
Household Electricity								
Yes	71.0% ***	34.9%	20.3% ***	*4556*	49.0%	9.7% *	3.7% *	*4971*
No	55.8 ***	25	13.5 ***	*1131*	37.7	3.9 *	1.3 *	*1246*
Father's education								
None	65.9%	30.3%	16.5%	*1430*	40.0% ***	6.6% **	1.5% ***	*1812*
Primary	63.1	29.8	16.5	*1658*	39.0 ***	7.3 **	1.4 ***	*1882*
Secondary	69.8	34.8	20.7	*2562*	52.2 ***	10.5 **	5.4 ***	*2501*
Mother's education								
None	63.7%***	31.6%	12.1% ***	*995*	43.6%	5.3%	1.2% ***	*1086*
Primary	59.4 ***	28.9	16.8 ***	*1821*	39.5	8.1	1.4 ***	*1989*
Secondary	73.2 ***	34.8	21.8 ***	*2857*	50.8	9.6	5.0 ***	*3128*

**p<.05 **p<.01 ***p<.001*

Table 2.3 Odds of all male and all female youth ever having consumed alcohol, having been drunk in the previous month, or ever having used drugs by all domains; (95%CI)

Independent variables *Reference categories in italics*	**Males (n=5,687)** **Consumed alcohol**	Drunk past month	Ever used drugs	**Females (n=6,217)** **Consumed alcohol**	Drunk past month	Ever used drugs
Paternal orphan	1.52 (1.12, 2.07) **	1.29 (0.95, 1.77)	0.84 (0.59, 1.19)	1.05 (0.84, 1.30)	0.83 (0.57, 1.21)	1.73 (1.03, 2.92) *
Maternal orphan	1.12 (.70, 1.82)	0.75 (0.49, 1.13)	1.19 (0.72, 2.01)	1.30 (0.88, 1.95)	0.91 (0.49, 1.72)	1.00 (0.40, 2.52)
Double orphan	2.65 (1.14, 6.18) *	1.19 (0.67, 2.12)	0.64 (0.27, 1.52)	2.80 (0.85, 9.20)	0.85 (0.27, 2.71)	0.22 (0.03, 1.92)
Non-orphan	1.00	1.00	1.00	1.00	1.00	1.00
Demographic factors						
18-20 yrs old	1.24 (0.74, 2.08)	1.70 (1.27, 2.29)**	2.10 (1.41, 3.11) ***	1.08 (0.81, 1.45)	1.15 (0.75, 1.75)	1.42 (0.76, 2.60)
21-24 yrs old	1.56 (0.76, 3.23)	2.21 (1.51, 3.23)***	3.01 (1.58, 5.72) **	0.98 (0.70, 1.38)	1.44 (0.86, 2.42)	1.14 (0.50, 2.61)
15-17 yrs old	1.00	1.00	1.00	1.00	1.00	1.00
Christian religion	1.24 (0.72, 2.12)	0.65 (0.41, 1.04)	0.87 (0.48, 1.57)	0 .96 (0.49, 1.87)	1.00 (0.46, 2.19)	0.40 (0.12, 1.25)
Traditional religion	0.74 (0.36, 1.49)	0.50 (0.27, 0.92) *	0.89 (0.39, 2.02)	1.14 (0.55, 2.35)	0.60 (0.18, 1.98)	0.28 (0.53, 1.51)
Other religion	0.62 (0.28, 1.32)	0.42 (0.21, 0.89) *	1.33 (0.63, 2.78)	0.50 (0.20, 1.24)	0.46 (0.13, 1.61)	0.73 (0.18, 3.00)
No religion	1.00	1.00	1.00	1.00	1.00	1.00
White	3.96 (1.65, 9.47) **	1.15 (0.67, 1.98)	3.62 (1.93, 6.82) ***	9.61 (5.67,16.30)***	0.66 (0.15, 2.84)	9.94 (4.30, 23.0) ***
Coloured	1.99 (1.36, 2.89) ***	1.43 (0.98, 2.10)	2.97 (1.94, 4.56) ***	3.53 (2.47, 5.05) ***	1.15 (0.43, 3.04)	9.18 (4.53, 18.6) ***
Indian	1.35 (0.70, 2.63)	0.63 (0.32, 1.23)	2.83 (1.41, 5.68) **	2.42 (1.25, 4.70) ***	0.93 (0.31, 2.78)	10.2 (3.58, 29.3) ***
Black	1.00	1.00	1.00	1.00	1.00	1.00
Traditional home or shack	0.86 (0.61, 1.21)	0.95 (0.66, 1.36)	1.18 (0.89, 1.56)	0.85 (0.69, 1.06)	0.72 (0.41, 1.25)	0.45 (0.17, 1.14)
Permanent home	1.00	1.00	1.00	1.00	1.00	1.00
No electricity	1.01 (0.80, 1.27)	1.09 (0.80, 1.50)	0.85 (0.59, 1,22)	0.89 (0.70, 1.14)	1.07 (0.53, 2.156	2.60 (0.88, 7.61)
Electricity	1.00	1.00	1.00	1.00	1.00	1.00
Urban residence	2.16 (1.66, 2.81) ***	1.67 (1.07, 2.58) *	1.27 (0.92, 1.74)	2.32 (1.88, 2.87) ***	1.87 (0.79, 4.41)	1.43 (0.56, 3.65)
Rural	1.00	1.00	1.00	1.00	1.00	1.00
Mother has no education	0.77 (0.55, 1.08)	1.13 (0.77, 1.66)	0.51 (0.35, 0.73) ***	1.01 (0.79, 1.29)	1.16 (0.70, 1.91)	1.40 (0.62, 3.18)
Mother has primary educ.	0.67 (0.54, 0.83) **	0.90 (0.68, 1.19)	0.76 (0.59, 0.99) *	1.00 (0.78, 1.27)	1.35 (0.92, 1.99)	0.84 (0.46, 1.52)
Mother has secondary education	1.00	1.00	1.00	1.00	1.00	1.00
Father has no education	1.26 (1.00, 1.59)	0.90 (0.69, 1.17)	1.38 (1.03, 1.84) *	0.94 (0.74, 1.20)	0.88 (0.56, 1.40)	0.90 (0.44, 1.84)
Father has primary education	1.14 (0.90, 1.46)	0.92 (0.68, 1.25)	1.06 (0.76, 1.48)	0.89 (0.72, 1.10)	0.89 (0.58, 1.37)	0.78 (0.40, 1.53)
Father has secondary education	1.00	1.00	1.00	1.00	1.00	1.00
Individual domain						
Has life goals	0.88 (0.73, 1.07)	1.04 (0.92, 1.17)	1.02 (0.85, 1.22)	0.92 (0.83, 1.03)	0.87 (0.72, 1.06)	1.21 (0.80, 1.32)
Does not have goals	1.00	1.00	1.00	1.00	1.00	1.00
Perceived life control (index)	0.96 (0.64. 1.42)	0.96 (0.70, 1.34)	0.80 (0.57, 1.11)	0.97 (0.76, 1.25)	0.78 (0.52, 1.19)	1.34 (0.68, 2.68)
Perceived small/mod vulnerability to HIV	1.61 (1.31, 1.98) ***	1.62 (1.19, 2.21) **	1.42 (1.03, 1.96) *	1.34 (1.12, 1.61) **	0.98 (0.67, 1.43)	1.57 (0.88, 2.81)
Perceived great vulnerability to HIV	2.53 (1.74, 3.70) ***	2.07 (1.33, 3.24) **	1.26 (0.87, 1.82)	1.35 (1.03, 1.77) *	1.62 (1.08, 2.43) *	2.29 (1.08, 4.87) *
No perceived vulnerability	1.00	1.00	1.00	1.00	1.00	1.00
Has traveled out of town in past 6 months	1.33 (1.05, 1.70) *	1.62 (1.32, 2.00) ***	1.14 (0.84, 1.57)	1.23 (1.06, 1.43) **	1.22 (0.86, 1.74)	2.21 (1.39, 3.52) **
Has not traveled out of town	1.00	1.00	1.00	1.00	1.00	1.00
Peer domain						
Peers are best source of info on love	0.72 (0.54, 0.98) *	0.93 (0.71, 1.23)	1.11 (0.85, 1.44)	1.00 (0.78, 1.29)	1.18 (0.86, 1.63)	1.30 (0.78, 2.16)
Others are	1.00	1.00	1.00	1.00	1.00	1.00
Peers are best source of info on sex. pressure	1.10 (0.79, 1.53)	0.87 (0.62, 1.22)	1.05 (0.80, 1.38)	1.28 (0.86, 1.92)	1.01 (0.67, 1.50)	0.76 (0.36, 1.57)
Others are	1.00	1.00	1.00	1.00	1.00	1.00
Talked to friends about HIV	1.00 (0.81, 1.23)	1.03 (0.80, 1.36)	1.11 (0.88, 1.41)	1.07 (0.88, 1.29)	1.10 (0.81, 1.50)	1.95 (1.23, 3.09) **
Has not talked to friend	1.00	1.00	1.00	1.00	1.00	1.00
Perceived peer pressure to have sex	1.17 (0.94, 1.45)	1.31 (0.99, 1.73)	1.51 (1.09, 2.07)*	.940 (0.73, 1.20)	1.36 (0.88, 2.11)	1.87 (0.90, 3.88)
No perceived pressure to have sex	1.00	1.00	1.00	1.00	1.00	1.00

Independent variables *Reference categories in italics*	**Males (n=5,687)** **Consumed alcohol**	Drunk past month	Ever used drugs	**Females (n=6,217)** **Consumed alcohol**	Drunk past month	Ever used drugs
School domain						
7 yrs school (primary) completed	0.82 (0.40, 1.67)	1.28 (0.76, 2.17)	0.70 (0.39, 1.26)	1.22 (0.71, 2.12)	0.68 (0.35, 1.34)	0.30 (0.06, 1.38)
8+ yrs (some high school) completed	1.37 (0.92, 2.07)	1.66 (1.13, 2.44) *	0.56 (0.33, 0.94) *	1.23 (0.80, 1.90)	0.55 (0.29, 1.05)	0.43 (0.13, 1.48)
0-6 years	1.00	1.00	1.00	1.00	1.00	1.00
Has any post-high school education	0.83 (0.51, 1.36)	0.74 (0.51, 1.06)	0.81 (0.52, 1.27)	1.16 (0.87, 1.55)	0.73 (0.45, 1.20)	1.00 (0.52, 1.96)
Has none	1.00	1.00	1.00	1.00	1.00	1.00
Is in school now	0.83 (0.51, 1.34)	0.86 (0.60, 1.24)	1.05 (0.74, 1.50)	0.92 (0.66, 1.29)	0.83 (0.52, 1.33)	1.03 (0.44, 2.40)
Is not in school	1.00	1.00	1.00	1.00	1.00	1.00
Is unemployed (and not in school)	1.45 (0.98, 2.12)	1.13 (0.80, 1.62)	1.92 (1.35, 2.73) ***	0.94 (0.69, 1.29)	0.94 (0.61, 1.44)	1.02 (0.46, 2.26)
Is employed (or in school)	1.00	1.00	1.00	1.00	1.00	1.00
Schools best source of HIV info	1.01 (0.80, 1.27)	0.88 (0.71, 1.07)	0.82 (0.63, 1.06)	0.92 (0.76, 1.11)	0.88 (0.65, 1.20)	1.23 (0.78, 1.94)
Others are	1.00	1.00	1.00	1.00	1.00	1.00
Has talked about HIV in school	1.28 (0.84, 1.96)	0.87 (0.60, 1.27)	1.43 (0.86, 2.40)	0.82 (0.53, 1.29)	0.89 (0.47, 1.68)	0.72 (0.18, 2.98)
Has not talked about HIV in school	1.00	1.00	1.00	1.00	1.00	1.00
Family domain						
Has a curfew	0.77 (0.53, 1.14)	0.81 (0.62, 1.04)	0.81 (0.61, 1.06)	0.64 (0.52, 0.79) ***	0.67 (0.42, 1.07)	0.76 (0.46, 1.26)
Does not have a curfew	1.00	1.00	1.00	1.00	1.00	1.00
Has supervision	0.87 (0.64, 1.19)	0.77 (0.63, 0.94) *	0.62 (0.50, 0.79) ***	0.78 (0.64, 0.95) *	0.76 (0.51, 1.15)	0.47 (0.27, 0.81) **
Does not have supervision	1.00	1.00	1.00	1.00	1.00	1.00
Has a guardian older than age 18	1.49 (0.93, 2.40)	1.17 (0.82, 1.69)	1.27 (0.90, 1.82)	1.80 (1.25, 2.60) **	1.03 (0.54, 1.98)	1.39 (0.61, 3.24)
Does not have a guardian	1.00	1.00	1.00	1.00	1.00	1.00
Family best source of HIV info	1.72 (0.97, 3.07)	1.49 (0.82, 2.70)	0.80 (0.39, 1.64)	0.68 (0.42, 1.12)	1.43 (0.72, 2.85)	1.51 (0.58, 3.93)
Others are	1.00	1.00	1.00	1.00	1.00	1.00
Has talked to family about HIV	1.21 (0.96, 1.52)	1.20 (0.91, 1.58)	1.11 (0.85, 1.43)	0.98 (0.82, 1.18)	0.94 (0.70, 1.27)	1.31 (0.84, 2.02)
Has not talked to family about HIV	1.00	1.00	1.00	1.00	1.00	1.00
Family source of info about love	1.14 (0.70, 1.84)	0.75 (0.47, 1.20)	1.47 (0.97, 2.26)	0.55 (0.40, 0.75)	1.20 (0.68, 2.18)	1.58 (0.88, 2.82)
Others are	1.00	1.00	1.00	1.00	1.00	1.00
Family source of info on sex. pressure	0.96 (0.63, 1.45)	0.74 (0.46, 1.18)	1.44 (0.93, 2.24)	0.91 (0.68, 1.22) ***	0.95 (0.61, 1.48)	1.05 (0.60, 3.24)
Others are	1.00	1.00	1.00	1.00	1.00	1.00
Community domain						
Feels very close to community	0.94 (0.75, 1.17)	0.98 (0.81, 1.19)	0.92 (0.74, 1.15)	1.02 (0.83, 1.26)	1.00 (0.75, 1.34)	0.85 (0.54, 1.34)
Feels somewhat or not at all close	1.00	1.00	1.00	1.00	1.00	1.00
Goes to faith services up to a few times/month	0.83 (0.51, 1.33)	0.78 (0.55, 1.08)	0.89 (0.61, 1.30)	1.08 (0.65, 1.87)	0.55 (0.29, 1.04)	1.32 (0.52, 3.39)
Goes to faith services weekly or more	0.38 (0.21, 0.68) **	0.39 (0.23, 0.68) **	0.47 (0.32, 0.67) ***	0.61 (0.35, 1.06)	0.44 (0.21, 0.92) *	0.73 (0.26, 2.09)
Does not attend faith services	1.00	1.00	1.00	1.00	1.00	1.00
Goes to youth group 3x/week or more	0.89 (0.70, 1.14)	0.98 (0.79, 1.22)	1.03 (0.81, 1.33)	1.13 (0.94, 1.36)	0.81 (0.57, 1.16)	1.16 (0.71, 1.92)
Goes to youth group less often	1.00	1.00	1.00	1.00	1.00	1.00
Attended street-party 1-2x/last month	2.06 (1.52, 2.78) ***	2.67 (1.78, 4.01) ***	1.51 (1.15, 2.00) **	2.25 (1.76, 2.90) ***	3.86 (1.99, 7.47) ***	1.33 (0.81, 2.19)
Attended street-party weekly or more	2.66 (1.92, 3.70) ***	5.06 (3.08, 8.29) ***	1.78 (1.31, 2.40) ***	1.78 (0.88, 3.61)	10.6 (6.15, 18.5) ***	2.83 (1.56, 5.11) **
Has not attended in the last month	1.00	1.00	1.00	1.00	1.00	1.00

** p<.05 **p<.01 ***p<.001*

Chapter 3

Substance use and sexual risk behaviors among orphaned and non-orphaned South African youth

Introduction

While the sub-Saharan HIV epidemic may be stabilizing, South Africa was still home to 5.7 million people with HIV in 2007 (UNAIDS, 2008), the largest HIV-infected population in the world. The primary mode of transmission, in this region, remains risky sexual behavior (UNAIDS, 2008) however substance use, including alcohol and use of illegal drugs (both of which are on the rise), contributes to transmission directly through needle sharing and indirectly through increasing risky sexual behavior (Morojele, Brook, & Kachieng'a, 2006; Parry, Carney, Peterson et al., 2007; Shisana, Rehle, Simbayi et al., 2008; Simbayi, Kalichman, Jooste et al., 2004; UNAIDS, 2008). In a region where HIV is as prevalent as it is in South Africa, substance use may be a significant contributing factor in the spread of infection.

Youth, especially young women, continue to be among the populations most vulnerable to HIV infection (UNAIDS, 2009). Most adolescents are not fully aware of the extent to which their behavior can impact their health (Kelley, Schochet, & Landry, 2004), which makes them particularly vulnerable to taking risk taking. The ongoing HIV/AIDS epidemic has also contributed to a large population of orphaned youth, as well as children, with more than 3 million residing in South Africa in 2007 (Meintjes, 2009). Of concern is whether these orphaned youth, at risk of having lost the protective structures of parents and communities, are more likely

to engage in substance use and risky sexual behaviors and thereby increase their exposure to sexually transmitted infections.

Risky behavior in all youth is influenced by social or contextual (more distal) factors, in addition to individual (more proximal) factors (Eaton, Flisher, & Aarø, 2003) and many researchers acknowledge the need to consider factors and domains beyond the individual in addressing substance use and sexual behavior in youth (DiClemente, Salazar, Crosby et al., 2005; DiClemente, Wingood, Crosby et al., 2001; Morojele, Flisher, Muller et al., 2002). Social-Cognitive theories have been used to identify proximal personal and inter-personal variables which are associated with sexual-risk behaviors (Bandura, 1997; Blum, Beuhring, Shew et al., 2000; Eaton, Flisher, & Aarø, 2003). At the same time, Primary Socialization theory (Oetting & Donnermeyer, 1998) has been used to consider substance use among adolescents in the United States, finding that the relationships between more distal factors of parents, peers, and schools have the most influence on adolescent substance use. In particular, research conducted among African youth emphasizes the need to include factors associated with the community when considering behavior of youth (Eaton, Flisher, & Aarø, 2003; Morojele, Flisher, Muller et al., 2002).

Although some studies done in South Africa have shown a relationship between the use of alcohol or illegal drugs and risky sexual behavior, most sampled adults or combined adult and youth populations (Morojele, Brook, & Kachieng'a, 2006; Parry, Carney, Peterson et al., 2007; Shisana, Rehle, Simbayi et al., 2008; Simbayi, Kalichman, Jooste et al., 2004), or focused on very specific populations such as youth in schools (Flisher & Chalton, 2001; Palen, Smith, Flisher et al., 2006) youth recruited in high risk venues (Mataure, McFarland, Fritz et al., 2002), or rural youth (Mpofu, Flisher, Bility et al., 2006). Most are not from large nationally representative samples, did not consider orphanhood, or did not include factors from non-

individual domains which have been shown to influence youth behavior. Thus, there remain important gaps in knowledge with respect to the use and misuse of substances, the pathways which then contribute to risky sexual behaviors (Parry & Pithey, 2006; Pithey & Morojele, 2002; WHO, 2006) and whether orphaned youth are more vulnerable.

Substance use and risky sexual behavior among youth

Some associations have been found in studies done in sub-Saharan Africa, linking substance use with youth having multiple partners. These include findings from studies looking at youth and adults which found that heavy drinking among 15 to 49 year olds in Botswanna was associated with multiple partners in the past year (Weiser, Leiter, Heisler et al., 2006) that rural 8 to 11th grade South African youth who had ever drunk alcohol were more likely to have more than one partner (Mpofu, Flisher, Bility et al., 2006) and that adolescents recruited in nightclubs and alcohol selling venues in Zimbabwe, alcohol and marijuana use was associated with multiple casual sexual relationships and transactional sex (Mataure, McFarland, Fritz et al., 2002).

Findings, with regard to the relationship between substance use and contraceptive use, including condoms, include both significant and insignificant associations. Studies have found that heavy drinking is associated with unprotected sex, as well as with multiple partners (Weiser, Leiter, Heisler et al., 2006), that both alcohol and "khat" (an herbal stimulant) are associated with unprotected sex (Kebede, Alem, Mitike et al., 2005) among out of school Ethiopian youth, that alcohol use can lead to improper use of condoms and condom failure (Simbayi, Kalichman, Jooste et al., 2004), and that a significantly larger percentage of sexually active youth 8th to 11th grade youth who had used alcohol or marijuana in their lifetimes reported sporadic condom use. However, Flisher & Chalton (2001) did *not* find a significant association

between the use of alcohol or inhalants and lack of contraceptive use among sexually active high school students.

The relationship between substance use and risky sexual behavior

Factors or circumstances which link substance use and sexual risk behaviors include reduced inhibitions, an enhanced "risk tolerance" or lack of fear of consequences (Mpofu, Flisher, Bility et al., 2006; WHO, 2006), and the reduced ability, or interest, in navigating protective behaviors such as using a condom (Morojele, Brook, & Kachieng'a, 2006). Venues of drinking, such as beer halls or parties where alcohol consumption and sexual behavior are both normative can create an environment where both behaviors may occur and where substance use can easily lead to risky sexual behavior (Mataure, McFarland, Fritz et al., 2002; Morojele, Brook, & Kachieng'a, 2006).

Vulnerability of orphaned youth

Parental death can be expected to contribute not only to reduced monitoring, supervision, and modeling; but also to financial constraints (Collins & Leibbrandt, 2007); altered or aborted schooling, as well as general and chronic stress, stigma, anxiety, and vulnerability to negative peer influences (Case & Ardington, 2006; Case, Paxson, & Ableidinger, 2004; Operario, Cluver, Rees et al., 2008; Sengendo & Nambi, 1997). All of these factors have been shown to influence risky behavior in adolescents (Cluver, Gardner, & Operario, 2007; Foster & Williamson, 2000; Kelley, Schochet, & Landry, 2004; Perrino, Gonzalez-Soldevilla, Pantin et al., 2000). The expectation in African communities has been that extended families will take over the care of orphaned children and adolescents. And while this has been true, as more orphaned children have been absorbed into families, and more adults have become ill,

extended family networks have been stretched and may not be as able to provide needed support and structure (Bicego, Rutstein, & Johnson, 2003; Foster & Williamson, 2000; UNAIDS, 2008).

Studies of sexual risk and orphaned youth are not altogether consistent, although they have largely found that orphaned youth are at some increased risk with female South African orphans (ages 15-24) more likely to have had multiple partners in the past year (Operario, Pettifor, Cluver et al., 2007) and female Zimbabwean maternal and double orphans (ages 15-19) more likely to have had more than one partner in their lifetime (Birdthistle, Floyd, Machingura et al., 2008). There have also been studies that showed that condom use or numbers of partners did not significantly differ between orphans and non-orphans (Gregson, Nyamukapa, Garnett et al., 2005; Hallman, 2004; Thurman, Brown, Richter et al., 2006). The differences in some of these findings may be related to different contextual and regional circumstances. The studies often did not consider orphan types (maternal, paternal, double, versus non-orphans), used different control variables, focused on different age groups and genders, and did not control for alcohol and drug use. It may also be that factors other than orphanhood have greater influences on certain behavioral outcomes. If multiple domains influence adolescent behavior, including them in the consideration of risk behaviors may add to our knowledge of risk to orphaned, as well as non-orphaned, youth.

Aims of this paper

The aims of this paper are to examine the relationship between substance use, orphanhood, and factors from 5 different domains (individual, peer, school, family, and community) and two sexual behaviors of South African adolescents. The sexual behaviors measured are: 1) having had more than one lifetime partner vs. only one partner and 2)

having used condoms regularly (always or more than 50% of the time) versus irregularly (50% of the time or less) in up to 3 partnerships in the past month. Substance use and being an orphan are expected to be positively associated with irregular condom use in the past month and having had more than one lifetime partner. After controlling for substance use, domains, beyond that of the individual, are expected to be positively associated with one, or both, sexual behaviors.

Methods

Study setting and sample selection

Data for this study were collected in a national household survey of South African youth ages 15 to 24 in 2003 with a systematic, stratified sampling of households across all nine provinces in South Africa. Participants were recruited using the enumeration areas (total of 714) from the 2001 census, as primary sampling units. Randomly selected segments from each enumeration area were chosen and all households within those segments were visited. One young person aged 15 to 24 years per household was randomly selected using the Kish grid and invited to participate in the interview. Three attempts were made to interview the adolescent on different days and at different times. A total of 15,414 enumerated households contained an eligible youth. Of those youth, 12.6% refused and 9.8% were not found at home after three repeated visits. In total, 11,904 interviews were completed. The sample was weighted to represent the South African population distribution of youth at the time (see Pettifor, Rees, Steffenson, Hlongwa-madikizela, MacPhail, Vermaak et al, 2004, for greater details regarding sample selection)

Survey instrument and interviews

The questionnaire was developed based on a review of similar South African and international surveys. Information was gathered on demographics, sexual reproductive behaviors and attitudes but the survey also included questions on family composition, schooling, peer influence, community characteristics as well as alcohol and drug use. The questionnaire was available in 9 South African languages and was pilot-tested in the field before use. Experienced interviewers aged 18 to 35 years were matched with participants on gender and race. The final survey instrument was translated from English into indigenous languages and back-translated to ensure comparability. Interviews were conducted face to face between March and August 2003. All procedures were approved by the Committee for the Protection of Human Subjects, University of the Witwatersrand, Johannesburg, South Africa (see Pettifor, Rees, Steffenson, et al, 2004 for details on design of the survey).

Theoretical framework

The theoretical framework which informs this study draws predominantly from Social Cognitive theories and Primary Socialization theory. These theories recognize that risk behaviors of adolescents are likely influenced by factors related to families and the communities in which they live, in addition to individual factors (Boerma & Weir, 2005; DiClemente, Salazar, Crosby et al., 2005).

Social cognitive theories (Bandura, 2001; Baranowski, Perry, & Parcel, 2002) recognize the importance of environment, modeling, and opportunities to practice behavior. Important constructs in Social Cognitive theory are "observational learning" and "outcome expectations". Individuals learn behaviors through their associations with any number of

people, including parents, peers, or other adults in their lives. Negative parental reaction to certain behaviors may therefore, reduce certain behaviors in children and adolescents while significantly positive responses from peers may enhance or reinforce those behaviors. These theories also focus on the individual characteristics which have been shaped by environmental or familial factors such as self-efficacy, self-control, and future expectations.

Primary Socialization theory (Oetting & Donnermeyer, 1998) has been used to study substance use behavior of western youth. The theory suggests that every society has primary sources for socialization of children and for adolescents, the relationships between families, schools and peers form either protective bonds or places of vulnerability. Important factors include remaining in school (where youth are also more likely to engage with pro-social peers), family monitoring, supervision and involvement, and peer relationships and values. These factors may be particularly important for orphaned youth where both family and school bonds are likely to be weakened due to parental death. Research done among African youth (Morojele, Flisher, Muller et al., 2002) emphasizes the importance of community based variables as "family" may be a broader concept in this region.

Concepts and constructs from Primary Socialization theory, Social Cognitive Theory, with the addition of community variables, will be used to consider if factors in the domains of community, school, peers, family, and the individual influence sexual risk behaviors for non-orphaned and orphaned adolescents. Substance use will be included as an individual behavioral factor.

Measures:

Outcome variables

More than one lifetime partner is a dichotomous variable comparing those who had one lifetime partner with those who had more than one. Thirty five percent of sexually active youth (25% of males and 45% of females) claimed to have had only one partner in their life time. Given the young age of those at the lower end of the age range, any partnerships more than one presents risk, even if the multiple partnerships are spread out over more than the previous year. Only sexually active subjects were included in the analyses. Adolescents in the study were asked if they had ever had vaginal sex and/or if they had ever had anal sex. Those who answered yes to either question were considered sexually active. Looking at life time partnerships also allowed us to maintain the same time reference with the independent variables of youth ever having used alcohol or drugs.

Regular condom use: Regular condom use was defined as having used a condom "always" or "more than half the time" with up to 3 partnerships in the past month. While we acknowledge that using condoms 100% of the time is the only fully protective behavior, we also recognize that few people use protection 100% of the time. Subjects were asked if they had used condoms "always" "more than half the time" "half the time" "less than half the time" or "never" with up to 3 partners in the previous month. We defined those who had used condoms "always or more than half the time" as using regularly and those who used condoms less than that as using irregularly. Married youth (2% of the total sample and 3% of the sexually active sample) were excluded from the analysis as decisions about condom use are expected to be different for those who are married.

Independent variables

The primary independent variables of interest were orphan status and substance use. For the outcome of multiple partnerships, substance use was based on questions asking youth if they had ever drunk alcohol, except to taste or for religious ceremonies, and if they had ever used drugs. For the outcome of regular condom use in the previous month, alcohol consumption, having been drunk, and drug use were restricted to use in the previous month. In both cases, we attempted to maintain the same time reference between substance use and the outcome of interest, and reduce the issues regarding temporality as much as was possible.

Orphan status was defined as being a maternal (only mother died), paternal (only father died), or double (neither parent is alive) orphan compared with being a non-orphan for the first outcome. Preliminary analyses showed that for regular condom use, while there was a difference between orphans and non-orphans, there was little difference among orphan subgroups. The sub-groups were therefore aggregated for the 2nd outcome and all orphans were compared with non-orphans.

Other independent variables were included based on the theoretical framework and prior research. They were grouped in domains, from individual (the most proximal) to community (the most distal) and also included family, school, and peer domains. Demographic variables included age, race, religion, urban versus rural residence, measures of household resources and parental education. Independent variables are described more fully in Table 3.1.

Data Analysis

Stata 9.2 was employed using survey (svy) commands because of the complex sampling design (i.e., not a simple random sample) of the survey, in order to obtain more accurate standard errors with provinces included as strata and enumeration areas as primary

sampling units. Probability weights were included to accurately represent the population of youth. The "subpopulation" option was used to analyze data on sexually active subjects ages 15-24 (n=7692) for the outcome of having had more than one life time partner, and unmarried subjects who had been sexually active in the previous month (n= 3818) for the outcome of regular condom use. Data for males and females were analyzed separately.

Bivariate analyses were conducted with all independent variables and with both outcome variables. Multivariate modeling was then done using logistic regression. Separate regression models were fitted for each outcome (multiple partners and regular condom use) and stratified by gender. The models included all the variables in all domains, as well as demographic variables. The same independent variables were used for all models except 1) for the outcome of having had more than one partner, alcohol and drug use was life time use 2) for the outcome of consistent condom use in the previous month, substance was limited to use in the previous month, all orphans were compared with non-orphans, married subjects were excluded from analysis, and a variable measuring self-efficacy for condom use was added.

Results

Sample

The sample for the outcome of having had multiple partners included 7,692 youth of with 67% of males and 68% of females (out of the total sample of 11,904) reporting having had either vaginal and/or anal sex. Of those, 3,818 were unmarried and had had sex in the previous month with 46% being male and 51% female (not shown).

Substance use: results for both outcomes

In bivariate analysis (Tables 3.2a to 3.2d), a significantly larger percentage (80%) of male youth who had consumed alcohol had had more than one lifetime partner compared with those who had not (60%). Among females 60% of those who had drunk alcohol had multiple partners while only 50% of those who had not consumed alcohol had multiple partnerships. Bivariate analysis did not show any statistically significant difference in condom use between those who had drunk in the past month, been drunk, or used drugs.

In multivariate analysis (Tables 3.3a and 3.3b), controlling for all variables, male youth who had consumed alcohol (versus not) had 86% greater odds and female youth had 97% greater odds of having had more than one partner. Those (male or female) who had ever used drugs had more than twice the odds of having had multiple partnerships. There was no statistically significant association between previous month's alcohol or drug use and regular condom use.

Orphanhood: results for both outcomes

Of those who had been sexually active, 31% of youth were orphaned males and 36% were orphaned females. Compared with non-orphans, a larger percentage of paternally orphaned males and maternally orphaned females had had more than one lifetime partner, in bivariate analysis (Table 3.2a).

Among youth who were single and had had sex in the previous month, 33% of males and 35% of females were orphaned. While a larger proportion of male non-orphans had used condoms regularly (versus irregularly), there was very little difference among the male orphan subgroups. Among females, smaller percentages of double and maternal orphans (compared with non-orphans) had used condoms regularly.

In logistic regression (Tables 3.3a and 3.3b), having controlled for substance use and multiple domains, female maternal orphans had greater odds (OR 2.55, $p<.05$) of having had more than one partner. Orphaned males did not have different odds of having had multiple lifetime partners, compared with non-orphans. However, we looked separately at partnerships in the previous year (data not shown). In that analysis, which included all the same variables but limited examination of multiple partners (more than one) to the previous 12 months, paternally orphaned males had 40% greater odds of having had more than one partner. When considering condom use, any orphaned male had 35% reduced odds of having used condoms regularly (OR 0.66, $p<.05$) in the previous month, compared with non-orphaned males.

Interactions between orphan sub-groups and both alcohol and drug use were examined for the outcome of multiple partners and were not found to be significant (data not shown). Interactions were also tested between orphans and alcohol use, drug use, and having been drunk for the outcome of regular condom use in the previous month. Again, none were significant.

Influence of domains

Some demographic variables and some factors in the individual domain appeared to exert the greatest influence on risk behaviors. While a number of factors in each domain were associated with youth behavior in bivariate analysis (see Tables 3.2a to 3.2d), fewer factors remained significant in the full regression models (Tables 3.3a and 3.3b).

Having had more than one lifetime partnership

In bivariate analysis, gender was significant in that 75% of all males had had more than one partner compared with 54% of all females (not shown). Older age, urban residence, and living in houses made of permanent materials were all associated with greater percentages

of youth (male or female) who had had more than one partner. Among females, both having more household resources (permanent homes, electricity) and having the least resources (living in shacks or temporary structures) was associated with multiple partnerships. A smaller percentage of females with any religious convictions had had more than one partner compared with those who claimed no religious faith. In multivariate analysis, only age and race remained significant for males but for females, living in traditional homes with no electricity was associated with reduced odds of having had more than one partner. This may reflect the influence of fewer resources for females but may also represent some urban versus rural differences. It may be that females with more resources (permanent homes and electricity) are more likely to be living in areas where venues of opportunity for multiple partners are greater.

In the individual domain a larger percentage of youth who perceived vulnerability to HIV had had more than one partner and this perceived vulnerability remained significant in multivariate analysis. While this seems counter-intuitive, it is very possible that youth knew they were vulnerable *because* they were engaging in riskier behavior. Males who had traveled out of town also had increased odds of having had more than one partner. Among females, but not males, higher life goals were associated with 16% reduced odds of having had multiple partners. A larger percentage of males who had spoken to peers (versus not spoken) about HIV had more than one partner. However, no peer factors remained significant, for males or females, in adjuseted logistic models.

A significantly larger percentage of youth (male and female) who had completed at least some high school had more than one partner, while a smaller percentage of those "in school" claimed multiple partnerships. This may be an association with age as older youth, who are more likely to have had more partnerships, have also completed more schooling. In

multivariate analysis, females who were in school were 34% less likely to have had more than one partner.

In the family domain, larger percentages of females who did not have a guardian, a curfew or supervision had multiple partners. For males only having had a guardian was significant. A larger percentage of sexually active females or males who'd spoken to their families about HIV had had more than one partner. In the adjusted logistic models, considering family to be the best source of HIV info was significantly associated with having had only one partner for males. Only supervision remained associated with having had only one partnership for females, although considering family to be a good source of HIV information approached significance for females ($p=.06$).

A smaller percentage of males or females who attended faith services had multiple partners, although the variable was only significant ($p<.05$) for males. A larger percentage of males who attended street parties also had more partnerships. In multivariate analysis, attending faith services was significantly associated with having had only one life partner for females while street parties remained associated with more partnerships for males.

Regular condom use in the previous month

A number of demographic variables were significant in association with regular condom use. When age ranges of 15-17, 18-20 and 21-24 were considered, condom use did not differ among the groups. However, when 15-18 year olds were compared with 19-24 year olds, a significantly greater percentage of younger youth had used condoms regularly (not shown). In multivariate analysis, claiming "traditional" religion, living in a traditional house, having no electricity was associated with reduced odds of males having used condoms regularly. Having a mother with primary education (compared with secondary or more) was associated with

both male and female youth who were *less* likely to have used condoms regularly and urban residence was associated with significantly greater odds of regular condom use. As rural youth were not significantly less likely to have been sexually active (not shown), there are probably other forces operational in rural versus urban populations which contribute to less regular condom use. These may include issues of availability of condoms and, potentially, traditional (perhaps rural) norms and expectations.

Among individual variables, bivariate analysis showed that a greater percentage of male or female youth who had life goals, perceived self efficacy for condom use, or who felt themselves to be less vulnerable to HIV had used condoms regularly. In multivariate analysis, having controlled for a wide array of other factors, males who had a sense of life control were less likely to have used condoms, while those who perceived self-efficacy for condom use had 3 fold greater odds of regular condom use. For females, the adjusted odds of regular condom use were significantly greater for those who had life goals, perceived self-efficacy for condom use, and did not perceive themselves to be vulnerable to HIV.

The peer domain was only significant in multivariate analysis which found that males who believed their peers were good sources of information about romance were more likely to have used condoms regularly in the previous month.

Bivariate results showed that a larger percentage of males or females who had more education, were in school, or had communicated about HIV in school had used condoms regularly. In multivariate analysis, having had post high school education remained associated with increased odds of condom use for both males and females. Females who had talked about HIV at school also had increased odds of having used condoms regularly.

A greater percentage of males or females who had guardians over the age of 18 and family supervision, or females who had curfews, had talked about HIV with their families, or

believed their families to be the best source of information about HIV had used condoms regularly. However, again, in multivariate analysis, only females who had a curfew had 36% greater odds of having used a condom regularly (p=.05).

Among community based variables, a larger percentage of females (but not males) who attended a youth group the previous month and males or females who had attended street parties had used condoms regularly. Multivariate models showed only that females who attended street parties had 2 fold odds of having used condoms regularly in the previous month.

Discussion

Our aim was to examine the association between substance use and sexual risk behaviors among youth in South Africa, having controlled for factors from a number of domains. We also wanted to consider if orphaned youth were at any increased risk of having had multiple partners or using condoms irregularly, and to see if domains beyond the individual contribute to youth engaging in risky sexual behavior.

Substance Use

We found that lifetime use of alcohol or drugs was associated with multiple partners, but that previous month's substance use did not influence regular condom use. Substance use has been shown to be associated with some forms of sexual risk taking, including having multiple partners, although the mechanisms are not always clear. Frequency of consumption (monthly versus weekly versus daily) has been found to be a contributing factor (Poulin & Graham, 2001) while other studies emphasize the importance of quantity (Morojele, Kachieng'a, Matsobane, Moshia, Mokoko, Parry et al., 2004). Parry et al (2005) articulate concerns

regarding the level of alcohol consumption among high school youth in South Africa, reporting that 25% engage in binge drinking (5 or more drinks), and link binge drinking to multiple partners. South African youth ages 14-15 have reported that drinking alcohol before having sex made them more comfortable and increased the likelihood that they would engage in sexual activity (Palen, Smith, Flisher et al., 2006), and alcohol has been linked to reduced inhibition and a desire to have sex with a more casual partner. Alcohol consumption before unplanned sex has also been found to lead to inconsistent condom use (Poulin & Graham, 2001) but, in line with our findings, the association between substance use and consistent condom use has not always been found (Palen, Smith, Flisher et al., 2006).

It would appear that while life time use of alcohol or drugs may be associated with behaviors such as multiple partners, as our study found, the timing, venue, and quantity of consumption is important and may be particularly associated with the behavior of condom use. It would have been helpful if we had been able to determine if adolescents habitually drank alcohol, got drunk, or used drugs at the time of sexual encounters.

Orphanhood

While a few studies have found orphaned youth to be more likely to have multiple partners (Birdthistle, Floyd, Nyagadza, Mudziwapasi, Gregson, & Glynn, 2009; Kang, Dunbar, Laver et al., 2008; Operario, Pettifor, Cluver et al., 2007), only Birdthistle et al. (2008) looking at a sample of 15-19 year old girls, found that maternal and double orphaned females were more likely to have had more than one partner in their life time and to have been less likely to have used a condom at first sex. No associations have been reported for orphaned males. Our findings that maternally orphaned females were at increased risk of having more than one partner, that paternally orphaned males were more likely to have had more than one partner

in the previous 12 months, and that any orphaned male was less likely to have used condoms regularly adds to these findings. A number of studies have suggested some pathways to explain increased risk to orphaned youth, including caregiver stress, poverty, and mental health issues in families of orphaned youth (Birdthistle, Floyd, Nyagadza et al., 2009; Cluver, Gardner, & Operario, 2008). Primary Socialization theory would postulate that these stressors in turn, not only lead to less supervision of youth, but less general influence by parents and caregivers and therefore the potential for increased negative influence by peers or non-familial acquaintances. Also, finding that maternally orphaned females and paternally orphaned males were at particular risk is important and supported by findings which suggest that youth in Africa are largely influenced by the same sex parent and same sex older sibling (Nsamenang, 2002) so that the absence of the same sex parent could increase an adolescents' vulnerability.

Domains

Although a few factors from most domains, except peers, did appear to be associated with the sexual risk behaviors, we had expected to find more significant associations. The domain which was most significant was the individual one, especially for females. Gender was, as expected, also important with significantly more males than females having had more than one partner. This may be related to cultural norms and expectations wherein male youth see multiple partnerships as a sign of masculinity and status (Morojele, Brook, & Kachieng'a, 2006). Condom use is also more often controlled by males, so factors which enable young women to use condoms regularly may be particularly important (Moyo, Levandowski, MacPhail, Rees, & Pettifor, 2008; Pettifor, Rees, Kleinschmidt et al., 2005).

Individual domain

According to social cognitive theories, the individual domain, while influenced by a variety of environmental and social factors, is most proximal and therefore most likely to be influential in risk behavior. Sayles et al (2006), studying factors associated with self efficacy, found significant associations between a number of factors associated with high self-efficacy and recent condom use among this same population of South African youth. We also found that factors associated with this domain, such as having fewer life goals and youth perceiving themselves to be vulnerability to HIV, were associated with having had more than one partner. Life goals were expected to provide a hope for the future thereby making youth more mindful of behavior. Perceived vulnerability to HIV is possibly present among youth who recognize that they are already engaging in risky behavior, thereby producing a positive association. Travel out of town was important for males and we would expect that more risky behavior is likely to take place when youth are away from parental or community monitoring or supervision (DiClemente, Wingood, Crosby et al., 2001). While having multiple partners may be a risky behavior if it occurs in the context of multiple casual, concurrent, or promiscuous partnerships, it may not be as high risk if it is representative of serial monogamy. However, condom use is a deliberate and protective behavior which, in the context of unmarried youth, can result in safer sexual behavior, even if an adolescent has more than one partner. It is therefore perhaps more significant that a number of individual factors were important in regular condom use, more so than with the outcome of multiple partners. Also, while individual factors surfaced as most significant, consistent with social cognitive theories, it is likely that family, peer, school, and community factors influenced the individual factors.

School and Peer domains

While we did not find the peer domain to be influential in either having multiple partners or in regular condom use, there were some factors from the school domain which were important. Schooling and connectedness to school has been suggested to be an important factor, according to Primary socialization theory. We did not have factors which directly measured school connectedness, but having some post-high school education likely places youth in a position of being able to access condoms and to have some life choices, which may have contributed to regular condom use by both males and females. Talking about HIV in school was also useful for females. Sayles et al, (2006)note that youth are more likely to practice safe sex if they have opportunities to communicate openly with sexual partners, peers, and other adults. School provides that option for youth and it may be that positive peer conversations and interactions occur in a school setting which were not captured by variables in the peer domain itself. Education has been found to be protective, especially for females, in other studies (Birdthistle, Floyd, Nyagadza et al., 2009) as well ones from this same population, looking at HIV infection and different measures of condom use (Pettifor, Levandowski, MacPhail, Padian, Cohen, & Rees, 2008; Sayles, Pettifor, Wong et al., 2006). Additionally, schooling and school completion, is an area where orphaned youth have been found to be at greater disadvantage compared with non-orphans (Operario, Cluver, Rees et al., 2008).

Family and Community domains

Family communication, having a guardian, and supervision were important family domain factors for males and females and reduced the likelihood of multiple partners. Having a curfew was also positively associated with females using condoms regularly. Community factors and family factors may blur in a setting where extended family constitutes some of the

community (Morojele, Flisher, Muller et al., 2002). The importance of family in shaping individual intentions, values, and efficacy is articulated in Social Cogntive Theories (Bandura, 1997; Blum, Beuhring, Shew et al., 2000) and family is also a key domain in Primary Socialization theory. Attending street parties, a community domain factor, was expectedly associated with having had more than one partner for males and was actually associated with an increased likelihood of condom use among females. It is not clear why this may be unless, hopefully, it means that females in this population are more likely to protect themselves if they engage in risky behavior. Street parties, along with other venues where it is more likely that attendees will engage in a number of risky behaviors (including both substance use and sexually risky behavior) have been used as examples of how venues, general "climate", and the social networks which develop there, are important in behavioral risk taking (Morojele, Flisher, Muller et al., 2002; Parry, Pluddemann, Steyn et al., 2005). In the relationship between alcohol use and high risk sexual behavior, it has been suggested that the context in which alcohol or drugs are consumed or used is even more important than the quantity or frequency of use (Kalichman, Simbayi, Jooste, & Cain, 2007).

Limitations

The limitations in this study include the cross-sectional design which, while allowing associations to be established with a variety of independent variables, does not allow causality to be attributed. The nature of the sensitive questions, especially regarding sexual behavior, is also subject to the risk of under-reporting by adolescent subjects. Third, there is always the issue of temporality with orphanhood as there was no way to determine if orphaned youth chose to engage with more partners before or after having been orphaned. As condom use was restricted to the previous month, it's likely that the time of orphaning is not as

problematic for that outcome. Last, in an effort to clarify the nature of the association between substance use and risky sexual behavior, it would have been helpful if alcohol and drug use had been measured by quantity as well as by frequency, if we had been able to determine if youth habitually used substances prior to sexual engagement, and if there were patterns of substance use in families and neighborhoods within which youth resided.

Conclusions

Despite existing limitations, we utilized data from a large, nationally representative survey of South African youth, controlled for a wide array of factors, and still found that lifetime alcohol and drug use were significantly associated with having had more than one life time partner but that previous month's substance use was not associated with regular condom use. Maternally orphaned females were found to be at increased risk of having had more than one life time partner, and orphaned males to be at increased risk of irregular condom use. Absence of a same sex parent may be particularly important. We also found that, having controlled for substance use, a number of factors within the domains of school, family, and community influenced all youth but that individual, and some demographic and contextual factor, were most influential. These findings add information to the growing knowledge base linking adolescent risk behaviors and point to the ongoing vulnerability of orphaned youth to behaviors which place them at increased risk of HIV infection, even when other factors which might mediate that relationship are controlled for. Further research should be directed at continuing to consider proximal and distal variables important in the pathways that lead from substance use to sexual risk taking among all youth in this region of southern Africa and at examining orphan sub-groups to see if certain sub-groups are at increased risk compared with others, and not only in comparison with non-orphaned youth.

Table 3.1 Description of independent variables for models examining youth having had more than one lifetime partner and regular condom use in the last 12 months

Demographic	**Age** 18-20 or 21-24 versus 15-17 **Race:** White, Coloured, Indian versus Black **Religion:** Christian, Traditional, Other vs. none **Household resources:** • **Electricity: Has electricity versus does not** • **House materials** house is made of traditional materials or is a shack versus permanent materials **Residence:** urban vs. rural **Education of mother:** none or completed primary versus completed secondary **Education of father:** none or completed primary versus completed secondary
Orphan sub-groups **For outcome of regular condom use**	**Paternal:** have lost father only **Maternal**: have lost mother only **Double**: have lost both parents **Non-orphan**: youth knows both parents are living **Any orphan** versus non-orphan
Substance Use ***For outcome of having had more than one partner** ***For outcome of regular condom use**	Ever used alcohol (binary) yes/no Ever used drugs (binary) yes/no Used alcohol in the past month (binary) yes/no Was drunk in the past month (binary) yes/no Used drugs in the past month (binary) yes/no
Individual Domain **For regular condom use**	**Life control**: (binary) youth believes that he/she has control over what happens in life versus not believing he/she has life control **Life goals**: index 0-4 from 4 questions: Do you have long range goals? Do you believe you have opportunities? Do you know what you want from life? Do you know where you're headed in the future? Higher score implies youth know what they want from life and have life goals. **Perceived vulnerability to HIV**: (categorical): small/moderate vulnerability; great vulnerability versus no perceived vulnerability **Travel out of town:** (binary) youth has traveled out of town in last 6 months (for any reason) yes/no **Self-efficacy for condom use**: (binary), combination of 3 questions asking youth if they believe they are always able to use a condom when having sex, would be able to refuse sex if their partner would not use a condom, would be able to talk about condom use with their partner. Self-efficacy for condom use meant youth answered yes to all questions.
Variables	**Description continued**

Peer Domain	**Peers are the primary source of knowledge about love or romance** (binary): Youth identifies peers versus others as best sources **Peers are the best source of knowledge about how to handle sexual pressure** (binary): Youth identifies peers versus identifying others **Have talked to peers about HIV** (binary- yes/no) **Perceived peer pressure to have sex** (binary- yes/no)
School Domain	**School completion** (years completed): completed primary school or 8+ years (some high school) versus 0 to 6years (less than primary schooling) **Any post-high school** (binary): Any schooling beyond high school (includes technical, vocational, or university) versus no post-high school education **In school** (binary): Is youth currently in school? (yes/no) **Unemployed** (binary): Is youth currently unemployed? yes/no Does not include those who are unemployed because they are in school **School is the best source of HIV info** (binary): Identifies school/school personnel as best sources of info versus identifying others **Have talked to people in school about HIV** (binary yes/no)
Family Domain	**Guardian** (binary): youth lives with a guardian who is age 18 or older versus does not **Curfew** (binary): youth is expected home by a certain time in the evening (yes/no) **Supervision** (binary)**:** youth is expected to tell parent/guardian where they are going when they go out (yes/no) **Youth has talked to parents or guardians about HIV** (yes/no) **Youth has learned the most about HIV/AIDS from family members (parents, guardians, other relatives—does not include siblings, or spouses)** (binary) identifies family members as best sources of HIV info versus identifying others **Youth consider family members (defined as above) to be the best source of knowledge about love and romance** (binary) identifies family members as best sources of knowledge on love and romance versus identifying others **Youth consider family members (defined as above) to be the best source of knowledge about resisting sexual pressure** (binary) youth identifies family members as best sources of knowledge on sexual pressure versus identifying others
Community domain	**Community closeness** (binary): perception that the community is very close based on whether people know and talk to each other vs. only somewhat or not close yes versus somewhat close/not close **Faith attendance** (categorical): Attends a faith-related services: weekly or more, 1-2 x per month up to 1-2 times per year versus not at all **Youth group** (binary): Attended a youth group (sports, music, theater) in the past month: 3-6+ times versus less often (or not at all) **Street party** (categorical): Attended a street party in the previous month: not at all, 1-2 times that month, a few times a week or daily

Table 3.2a. Percent sexually active males and females, ages 15-24, by orphan and demographic characteristics, who have had more than one life time partner, or who are single and used condoms regularly in the past month (*weighted percents; unweighted n's*).

	Males				**Females**			
	Sexually active males n=3626	% who have had more than 1 partner	*Single males sexually active past mo n= 1701*	% who used condoms regularly past month	*Sexually active females n=4066*	**%** who have had more than 1 partner	*Single females Sexually active past mo n= 2117*	% who used condoms regularly past month
Non-orphans	*2502*	73.8 %	*1150*	48.7 % *	*2734*	53.4 %	*1395*	40.8 %
vs								
Orphans	*1123*	78.3 %	*551*	33.9 *	*1330*	56.7	*722*	38.7
Paternal	*791*	81.5	*391*	34.3 *	*951*	57.8	*519*	41.6
Maternal	*199*	75.5	*89*	33.9 *	*219*	70.8	*120*	35.3
Double	*133*	65.8	*71*	31.9 *	*160*	40.4	*83*	28.6
Single	*3581*	75.2 %	*1701*	43.7 %	*3865*	59.3 %	*2117*	40.1 %
Married	*45*	74.1		--	*201*	54.4		---
Age								
15-17	*730*	55.8 ***	*244*	46.5%	*739*	35.5 %***	*361*	40.1%
18-20	*1485*	73.0 ***	*715*	46.6	*1566*	48.7 ***	*813*	40.8
21-24	*1411*	84.3 ***	*742*	41.2	*1761*	65.5 ***	*943*	39.5
Race								
Black	*3102*	75.6%	*1484*	41.3 %**	*3573*	55.5%	*1867*	40.1 %*
Coloured	*360*	74.2	*154*	48.3 **	*362*	46.9	*193*	30.9*
White	*103*	70.7	*37*	73.9 **	*91*	56.2	*43*	55.8*
Indian	*61*	71.3	*26*	72.0 **	*40*	25.8 (.06)	*14*	54.2*
Religion								
Christian	*2976*	74.3%	*1367*	44.6% *	*3618*	56.2% *	*1891*	41.2 %*
Traditional	*159*	84.0	*71*	29.8 *	*280*	34.6 *	*143*	32.8 *
Other	*97*	71.5	*52*	63.1 *	*98*	43.4 *	*26*	52.6 *
None	*390*	79.4	*210*	39.2 *	*98*	70.0 *	*56*	19.8 *
Residence								
Rural	*1714*	69.4% *	*838*	53.8 %***	*2002*	48.4% *	*1042*	30.7 ***
Urban	*1911*	80.0 *	*863*	31.4 ***	*2064*	60.2 *	*1075*	47.6 ***
Housing materials								
Permanent	*2600*	75.6% *	*1236*	48.9 % **	*2842*	58.5% ***	*1470*	42.7%
Traditional	*589*	67.8 *	*271*	23.7 **	*659*	38.8 ***	*325*	36.6
Shack/other	*433*	82.9 *	*193*	41.8 **	*565*	62.9 ***	*322*	33.2
Household Electricity								
Yes	*2895*	77.6%	*1363*	50.0 %***	*3195*	59.4	*1673*	43.1%*
no	*730*	68.9	*338*	25.9 ***	*861*	42.9	*437*	30.5 *
Father has								
no education	*938*	75.2%	*448*	38.5 %*	*1291*	54.7	*699*	31.1 %**
Primary edu	*1086*	76.2	*530*	39.5 *	*1310*	53.4	*674*	38.3 **
Secondary +	*1582*	74.6	*716*	49.9 *	*1449*	57.4	*738*	48.4 **
Mother has								
no education	*650*	77.1%	*326*	39.4% **	*811*	49.1	*438*	37.4 %**
Primary edu	*1184*	72.1	*561*	35.4 **	*1399*	56.8	*716*	28.7 **
Secondary +	*1783*	76.8	*812*	51.7 **	*1846*	56.1	*960*	48.3 **

**p<.05 ** p<.01 *** p<.001 Note: Cross tabulations resulted in some missing n's so category totals may differ from heading totals*

Table 3.2b. Percent sexually active males and females ages 15-24, by individual characteristics who have had more than 1 life time partner, or are single and used condoms regularly in the past month *(weighted percents, unweighted n's)*

	Males				**Females**			
	Sexually active males n=3626	% who have had more than 1 partner	*Single males sexually active past mo n= 1701*	% who used condoms regularly past month	*Sexually active females n= 4066*	% who have had more than 1 partner	*Single females sexually active past mo n= 2117*	% who used condoms regularly past mo
Individual Factors:								
Ever consumed alcohol								
vs. never used	*2778*	80.5% ***	----	----	*1926*	59.7%	----	----
	847	60.4 ***	----	----	*2140*	49.6	----	----
Ever used drugs								
vs. never used								
	835	85.6 ***	----	----	*106*	64.0%	----	----
Drank in the past month	*2790*	71.9 ***	----	----	*3960*	54.3	----	----
vs. did not								
	----	----	*960*	43.0 %	----	----	*391*	42.4%
Was drunk in the past month	----	----	*739*	44.8	----	----	*1723*	39.4
vs. was not								
Used drugs in the past month vs. did not use	----	----	*821*	42.0%	----	----	*249*	37.4%
	----	----	*875*	45.1	----	----	*1859*	40.3

Perceived life control	----	----	*269*	37.7%	----	----	*20*	39.7%
Yes	----	----	*1430*	44.9	----	----	*2095*	40.0
No								
Lifegoals index								
score 0	*3245*	76.6 %	*1520*	43.0%	*3517*	53.9 %	*1839*	41.4%
score 1	*381*	64.4	*181*	50.7	*549*	58.9	*278*	32.4 p=.07
score 2								
score 3								
score 4								
	79	75.5 %	*40*	37.4 **	*111*	46.0%	*58*	11.0% ***
Perceived	*92*	62.5	*49*	20.7 **	*163*	**	*86*	18.5 ***
vulnerability to	*234*	55.4	*121*	29.8 **	*302*	68.6 **	*175*	20.1 ***
HIV	*490*	80.9	*240*	38.2 **	*680*	61.6 **	*369*	31.4 ***
0 none	*2727*	76.7	*1249*	47.2 **	*2793*	60.4 **	*1421*	46.4 ***
1 small/mod						52.2 **		
2 great								
Traveled out of								
town in past 6	*1185*	69.6 %	*489*	47.7% **	*1054*		*491*	53.5 %***
mos vs. not	*1881*	76.1	*935*	46.5 **	*1923*	51.8%	*1021*	41.2 ***
	501	85.7	*252*	28.2 **	*961*	55.5	*538*	24.8 ***
Condom						55.9		
efficacy-yes								
No efficacy								
	1928	82.2% *	*801*	42.3%	*2247*		*993*	40.3
	1694	68.9 *	*900*	45.2	*1814*	57.8	*1124*	39.8
						52.0		
								51.9% ***
	----	----	*1019*	55.7% ***	----		*1195*	23.4 ***
	----	----	*680*	25.3 ***	----	----	*921*	

** p<.05 ** p<.01 ***p<.001*

Table 3.2c. Percent sexually active males and females ages 15-24, by peer and school characteristics, who have had more than 1 life time partner, or, who are single and used condoms regularly in the past month *(weighted percents, unweighted n's)*

	Males				**Females**			
	Sexually active males n= 3626	% who have had more than 1 partner	*Single males sexually active past month n= 1701*	% who used condoms regularly past month	*Sexually active females n= 4066*	% who have had more than 1 partner	*Single females sexually active past month n= 2117*	% who used condoms regularly past month
Peer factors								
Peers are best source of knowledge re: love	*1182*	75.3	*563*	47.1	*1172*	52.9	*611*	35.8
vs. others are	*2442*	75.1	*1137*	42.1	*2894*	55.3	*1506*	41.8
Peers are best source of knowledge re: sexual pressure	*1034*	77.1	*499*	42.8	*745*	46.8	*392*	37.6
vs. others are	*2588*	74.3	*1201*	44.2	*3317*	57.0	*1724*	40.4
Talked to friends about HIV								
Yes	*2142*	78.1 *	*986*	45.2	*2325*	58.4	*892*	40.5
No	*1467*	71.3 *	*706*	41.8	*1729*	52.1	*1218*	39.8
Feel peer pressure to have sex								
Yes	*913*	74.8%	*410*	41.8%	*510*	48.7%	*265*	34.3%
No	*2711*	75.3	*1291*	44.3	*3547*	55.7	*1848*	40.7
School factors								
Completion:								
0-6 years (base)	*308*	67.4 %**	*156*	25.8 %**	*276*	34.7% *	*154*	26.7% *
7 yrs	*238*	45.3 **	*107*	31.8 **	*222*	53.9 *	*122*	16.8 *
8+ yrs	*3073*	78.5 **	*1434*	46.2 **	*3566*	56.5 *	*1840*	42.6 *
Any post-high school education	*370*	81.7%	*191*	67.1 %***	*351*	57.2%	*165*	63.3% ***
no post HS	*3256*	74.3 p=.06	*1510*	40.1 ***	*3715*	54.3	*1952*	37.8 ***
In school now	*1896*	68.4 ***	*780*	49.2 *	*1706*	46.3 ***	*871*	52.1 ***
Not in school	*1728*	81.6 ***	*920*	39.7 *	*2357*	59.7 ***	*1244*	32.7 ***
Unemployed & not in school)	*1029*	81.9% ***	*530*	39.6%	*1853*	58.8 *	*953*	30.7 ***
employed or in school	*2595*	72.2 ***	*1170*	46.1	*2210*	50.4 *	*1162*	48.9 ***
School best source of info on HIV: Yes	*1047*	74.4%	*427*	51.5 *	*1127*	54.5%	*548*	38.1%
No	*2578*	75.4	*1273*	41.5 *	*2937*	54.7	*1569*	40.7
Talked about HIV in school	*230*	69.2%	*95*	52.7%	*222*	57.2%	*86*	71.9 %**
Did not	*3396*	75.5	*1606*	43.3	*3844*	54.4	*2031*	38.1 **

**p<.05 **p<.01 ***p<.001*

Table 3.2d. Percent sexually active males and females ages 15-24, by family and community characteristics, who have had more than one lifetime partner, or who are single and used condoms regularly in the past month *(weighted percents, unweighted n's)*

	Males				**Females**			
	Sexually active males n= 3626	% who have had more than 1 partner	*Single males sexually active past mo n= 1701*	% who used condoms regularly past month	*Sexually active females n= 4066*	% who have had more than 1 partner	*Single females sexually active past mo n= 2117*	% who used condoms regularly past month
Family								
Has guardian	*3166*	73.9 *	*1448*	45.8 *	*3376*	52.9 *	*1752*	43.1 *
No guardian	*459*	83.7 *	*253*	32.4 *	*690*	62.7 *	*365*	27.6 *
Has a curfew	*1416*	76.0	*599*	44.1	*1927*	48.4 **	*941*	47.6 **
No curfew	*2197*	74.6	*1097*	43.2	*2133*	60.4 **	*1173*	34.1 **
Has supervision	*1636*	73.9	*715*	50.1 **	*2348*	51.2 **	*1217*	44.7 *
No supervision	*1988*	76.2	*986*	39.3 **	*1713*	59.4 **	*869*	33.8 *
Talked to family about HIV	*1428*	77.9 *	*696*	44.9	*1855*	58.9 *	*972*	45.7 *
Has not	*2198*	73.3 *	*1005*	42.8	*2211*	50.9 *	*1145*	35.1 *
Family best source of HIV info	*104*	68.4	*41*	57.5	*120*	31.9	*67*	57.6 **
vs. others are	*3522*	75.4	*1660*	43.4	*3946*	55.8	*2050*	39.4 **
Family is best source of knowledge re: love								
vs. others are	*177*	81.7	*80*	45.6	*354*	50.8	*200*	43.7
	3447	74.8	*1620*	43.6	*3712*	54.9	*1917*	39.6
Family best source of knowledge re: sexual pressure	*163*	73.4	*73*	55.6	*387*	52.8	*209*	38.9
vs. others are	*3459*	75.3	*1627*	43.2	*3675*	54.9	*1907*	39.9
Community								
Feels close to community	*2144*	74.3	*1020*	39.6 *	*2070*	52.0	*1116*	34.7 *
Does not	*1478*	76.7	*697*	49.7 *	*1995*	57.3	*1001*	45.3 *
Faith service Attendance								
Not at all	*650*	79.3 **	*340*	41.5	*177*	69.1	*89*	24.9
A few times/yr to 1-2x/month	*1528*	80.1 **	*724*	48.8	*1326*	53.4	*712*	43.4
Weekly or more	*1447*	67.9 **	*637*	39.4	*2562*	54.2	*1316*	39.3
Youthgroup (in the last mo)								
Less than 3x/wk	*1408*	77.7	*670*	42.6	*2843*	56.5 *	*1502*	36.3 ***
3x/week or more	*2211*	73.6	*1029*	45.5	*1222*	50.3 *	*614*	49.5 ***
Streetparty (in the last mo)								
Not in last mo	*2002*	69.0 ***	*870*	38.2 **	*3244*	53.7	*1667*	36.0 ***
1-2x/month	*869*	83.7 ***	*447*	47.1 **	*573*	62.3	*316*	50.7 ***
Weekly or more	*755*	83.2 ***	*384*	53.1 **	*249*	50.2	*134*	62.0 ***

**p<.05 ** p<.01 *** p<.001*

Table 3.3a Odds of youth having had more than one sexual partner in their life time (aOR, CI 95%)

Independent variables	**Males n= 3626**	**Females= 4066**
Reference category in italics		
Paternal orphan	1.34 (.89, 2.00)	1.25 (0.89, 1.76)
Maternal orphan	0.89 (.56, 1.43)	2.55 (1.04, 6.28) *
Double orphan	0.60 (.28, 1.28)	0.71 (0.36, 1.38)
Non-orphan	1.00	1.00
Having drunk alcohol (lifetime)	1.86 (1.34, 2.59) ***	1.97 (1.55, 2.50) ***
No use	1.00	1.00
Having used drugs (lifetime)	2.25 (1.53, 3.30) ***	2.30 (1.25, 4,20) **
No use	1.00	1.00
18-20 yrs old	1.54 (1.11, 2.14) *	1.99 (1.48, 2.67) ***
21-24 yrs old	2.32 (1.46, 3,68) ***	4.70 (3.12, 7.07) ***
15-17 yrs old	1.00	1.00
Christian religion	0.74 (0.40, 1.37)	1.50 (0.62, 3.61)
Traditional religion	1.18 (0.51, 2.75)	0.65 (0.25, 1.70)
Other religion	0.52 (0.23, 1.21)	1.38 (0.38, 5.01)
No religion	1.00	1.00
White	0.18 (.084, 0.38) ***	0.72 (0.33, 1.54)
Coloured	0.48 (0.28, 0.80) ***	0.25 (0.16, 0.40) ***
Indian	0.62 (0.28, 1.40)	0.98 (0.03, 0.28) ***
Black	1.00	1.00
Traditional home	1.31 (0.80, 2.16)	0.73 (0.53, 1.00) p=.05
Shack	1.52 (0.90, 2.58)	1.09 (0.80, 1.50)
Permanent home	1.00	1.00
No electricity	0.83 (0.55, 1.24)	0.73 (0.54, 0.96) *
Has electricity	1.00	1.00
Urban residence	1.17 (0.83, 1.67)	0.98 (0.76, 1.25)
Rural	1.00	1.00
Mother has no education	1.29 (0.88, 1.90)	1.02 (0.76, 1.39)
Mother has primary educ.	1.05 (0.74, 1.49)	0.99 (0.77, 1.29)
Mother has secondary education	1.00	1.00
Father has no education	0.76 (0.52, 1.12)	0.91 (0.63, 1.32)
Father has primary education	0.99 (0.68, 1.42)	0.85 (0.65, 1.12)
Father has secondary education	1.00	1.00
Individual factors		
Has life goals	1.14 (0.95, 1.35)	0.84 (0.73, 0.97) *
No life goals	1.00	1.00
Perceived life control (index)	1.16 (0.78, 1.72)	0.79 (0.57, 1.07)
Perceived sm/mod vulnerability to HIV	1.36 (1.02, 1.83) *	1.32 (1.06, 1.68) *
Perceived great vulnerability to HIV	2.42 (1.59, 3.67) ***	1.23 (0.95, 1.61)
No perceived vulnerability	1.00	1.00
Has traveled out of town	1.88 (1.17, 2.82) **	1.07 (0.85, 1.33)
Has not traveled out of town	1.00	1.00
Peer factors		
Peers are best source of info on love	0.97 (.74, 1.26)	1.03 (0.84, 1.28)
Not best source of info on love	1.00	1.00
Peers are best source of info on sexual pressure	1.08 (.80, 1.46)	0.96 (0.70, 1.30)
Not best source of info on sexual pressure	1.00	1.00
Talked to friends about HIV	1.23 (0.89, 1.70)	1.12 (0.85, 1.45)
Have not talked to friends	1.00	1.00
Peer pressure to have sex	1.09 (0.80, 1.48)	1.04 (0.72, 1.49)
No perceived peer pressure	1.00	1.00

Independent variables	Males n= 3626	Females= 4066
School factors		
7 yrs (primary) completed	0.58 (0.25, 1.31)	1.71 (0.96, 3.02)
8+ yrs (some high school) completed	1.50 (0.82, 2.74)	1.56 (0.98, 2.50)
0-6 yrs completed	1.00	1.00
Has any post-high school education	1.09 (0.68, 1.73)	0.77 (0.54, 1.08)
No post high school education	1.00	1.00
Is in school now	0.71 (0.45, 1.11)	0.67 (0.46, 0.97) *
Is not in school	1.00	1.00
Is unemployed (but not in school)	0.96 (0.63, 1.47)	0.91 (0.66, 1.25)
Is employed	1.00	1.00
Schools best source of HIV info	0.97 (0.73, 1.29)	0.96 (0.76, 0.22)
Schools not best source	1.00	1.00
Have talked about HIV in school	0.87 (0.52, 1.48)	1.31 (0.57, 3.00)
Have not talked about HIV in school	1.00	1.00
Family factors		
Has a curfew	1.36 (0.90, 2.09)	0.97 (0.78, 1.23)
Does not have a curfew	1.00	1.00
Has supervision	0.87 (0.66, 1.13)	0.75 (0.59, 0.94) *
Does not have supervisions	1.00	1.00
Has a guardian older than age 18	0.61 (0.36, 1.03) p=.06	1.15 (0.79, 1.70)
Does not have a guardian > age 18	1.00	1.00
Family best source of HIV info	0.48 (0.24, 0.94) *	0.59 (0.31, 1.12)
Family not the best source	1.00	1.00
Have talked to family about HIV	1.08 (0.85, 1.37)	1.24 (0.99, 1.56) p=.06
Have not talked to family about HIV	1.00	1.00
Family source of info about love	1.35 (0.71, 2.60)	0.67 (0.44, 1.06)
Family not a good source of info on love	1.00	1.00
Family source of info on sexual pressure	0.86 (0.46, 1.60)	1.06 (0.71, 1.58)
Family not a good source of info on sexual pressure	1.00	1.00
Community factors		0.86 (0.70, 1.05)
Feels close to community	1.18 (0.89, 1.56)	
Goes to faith services a few times per year up to a few times/mo	1.45 (0.88, 2.37)	0.46 (0.23, 0.93) *
Goes to faith services weekly or more	0.89 (0.54, 1.46)	0.43 (0.22, 0.87) *
Goes to youth group 3x/week or more	0.99 (0.75, 1.31)	1.04 (0.80, 1.37)
Attended street-party 1-2x/last month	2.16 (1.56, 2.99) ***	1.29 (0.92, 1.81)
Attended street-party weekly or more	1.87 (1.29, 2.71) ***	0.99 (0.64, 1.51)

*p<.05 ** p<.01 ***p<.001*

Table 3.3b. Odds of youth having used condoms regularly with up to 3 partners in the past month aOR (95% CI)

Independent variables	Males n= 1701	Females n=2117
Reference categories in italics		
Orphan	0.66 (0.45, 0.94) *	1.17 (0.90, 1.54)
Non-orphan	1.00	1.00
Having drunk alcohol in the past month	0.77 (0.41, 1.45)	0.96 (0.52, 1.74)
Have not drunk alcohol in the past month	1.00	1.00
Having been drunk in the past month	0.96 (0.51, 1.84)	0.63 (0.30, 1.34)
Have not been drunk past month	1.00	1.00
Having used drugs in the past month	0.83 (0.55, 1.28)	0.95 (0.25, 3.61)
Have not used drugs in past month	1.00	1.00
18-20 yrs old	0.89 (0.55, 1.45)	1.06 (0.70, 1.63)
21-24 yrs old	0.73 (0.42, 1.25)	1.04 (0.64, 1.71)
15-17 yrs old	1.00	1.00
Christian religion	0.85 (0.45, 1.59)	1.13 (0.34, 3.41)
Traditional religion	0.47 (0.23, 0.98) *	1.27 (0.38, 4.2)
Other religion	1.13 (0.36, 3.56)	1.81 (0.33, 9.8)
No religion	1.00	1.00
White	1.26 (0.48, 3.32)	0.49 (0.15, 1.54)
Coloured	0.83 (0.46, 1.53)	0.57 (0.34, 0.98) *
Indian	1.14 (0.39, 3.35)	0.44 (0.13, 1.55)
Black	1.00	1.00
Traditional home	0.56 (0.33, 0.92) *	1.38 (0.91, 2.09)
Shack	1.04 (0.67, 1.64)	0.70 (0.45, 1.06)
Permanent home	1.00	1.00
No electricity	0.59 (0.37, 0.93) *	0.77 (0.52, 1.14)
Has electricity	1.00	1.00
Urban residence	1.81 (1.25, 2.64) **	2.50 (1.78, 3.50) ***
Rural	1.00	1.00
Mother has no education	1.15 (0.72, 1.86)	0.98 (0.63, 1.54)
Mother has primary education	0.68 (0.48, 0.96) *	0.61 (0.42, 0.88) **
Mother has secondary education		
Father has no education	1.31 (0.84, 2.05)	0.77 (0.52, 1.14)
Father has primary education	1.23 (0.80, 1.91)	1.03 (0.71, 1.50)
Father has secondary education	1.00	1.00
Individual factors	1.06 (0.89, 1.26)	1.29 (1.07, 1.57) **
Has life goals	1.00	1.00
No life goals	0.65 (0.43, 0.96) *	0.98 (0.63, 1.49)
Perceived life control (index)		
Perceived self efficacy for condom use	3.22 (2.33, 4.46) ***	2.44 (1.78, 3.33) ***
No perceived self efficacy	1.00	1.00
Perceived sm/mod vulnerability to HIV	0.96 (0.68, 1.34)	0.55 (0.40, 0.77) **
Perceived great vulnerability to HIV	0.67 (0.41, 1.09)	0.36 (0.23, 0.55) ***
Does not perceive vulnerability to HIV	1.00	1.00
Has traveled out of town	0.88 (0.65, 1.19)	0.86 (0.64, 1.15)
Has not traveled out of town	1.00	1.00
Peer factors		
Peers are best source of info on love	1.41 (1.02, 1.94) *	0.79 (0.57, 1.10)
Peers are not the best source of info on love	1.00	1.00
Peers are best source of info on sexual pressure	0.89 (0.63, 1.24)	0.95 (0.67, 1.34)
Peers are not the best source	1.00	1.00
Has talked to friends about HIV	1.19 (0.85, 1.66)	1.27 (0.96, 1.70)
Has not talked to friends about HIV	1.00	1.00
Peer pressure to have sex	0.84 (0.57, 1.23)	0.90 (0.56, 1.46)
Does not perceive peer pressure	1.00	1.00

Independent variables	Males n= 1701	Females n=2117
School factors		
7 yrs (primary) completed	1.18 (0.51, 2.75)	0.61 (0.23, 1.57)
8+ yrs (some high school) completed	1.41 (0.70, 2.84)	0.96 (0.45, 2.03)
0-6 years completed	1.00	1.00
Has any post-high school education	1.89 (1.13, 3.17) *	2.00 (1.20, 3.34) **
No post high school education	1.00	1.00
Is in school now	1.15 (0.74, 1.79)	1.24 (0.77, 2.00)
Is not in school	1.00	1.00
Is unemployed (and not in school)	1.17 (0.77, 1.77)	0.85 (0.56, 1.30)
Is employed	1.00	1.00
Schools best source of HIV info	1.06 (0.76, 1.48)	0.95 (0.69, 1.33)
Schools not best source of HIV info		
Has talked about HIV in school	1.43 (0.82, 2.48)	3.42 (1.36, 8.60) **
Has not talked about HIV in school	1.00	1.00
Family factors		
Has a curfew	1.12 (0.80, 1.56)	1.36 (0.99, 1.88) p=.05
Does not have a curfew	1.00	1.00
Has supervision	1.24 (0.88, 1.75)	1.03 (0.74, 1.42)
Does not have supervision	1.00	1.00
Has a guardian older than age 18	1.34 (0.54, 3.29)	1.42 (0.83, 2.43)
Does not have a guardian > age 18	1.00	1.00
Family best source of HIV info	0.91 (0.65, 1.27)	1.67 (0.82, 3.40)
Family is not best source of HIV info	1.00	1.00
Has talked to family about HIV	0.66 (0.30, 1.45)	1.12 (0.83, 1.52)
Has not talked to family about HIV	1.00	1.00
Family best source of info about love	1.06 (0.49, 2.29)	0.97 (0.57, 1.65)
Family not best source of info about love	1.00	1.00
Family best source of info on sexual pressure	1.47 (0.84, 2.58)	0.93 (0.58, 1.50)
Family not best source of info on sexual pressure	1.00	1.00
Community factors		
Feels close to community	0.88 (0.65, 1.16)	0.79 (0.59, 1.04)
Does not feel close	1.00	1.00
Goes to faith services a few times per year up to a few times/mo	1.45 (0.85, 2.51) 1.00	2.00 (0.70, 5.70) 1.00
Goes to faith services weekly or more	0.94 (0.53, 1.64)	1.98 (0.68, 5.74)
Does not attend faith services	1.00	1.00
Goes to youth group 3x/week or more	1.04 (0.75, 1.43)	1.28 (0.92, 1.79)
Goes to youth group less often or not at all	1.00	1.00
Attended street-party 1-2x/last month	1.02 (0.70, 1.49)	2.03 (1.33, 3.11) **
Attended street-party weekly or more	1.28 (0.85, 1.92)	2.67 (1.12, 6.30) *
Did not attend street-party last month	1.00	1.00

**p<.05 ** p<.01 *** p<.001*

Chapter 4

Conclusions, Limitations and Strengths

Conclusions

This study aimed first to examine alcohol and drug use among a nationally representative population of South African youth, to consider if orphaned youth were at increased risk of substance use, and to identify factors associated with substance use in this population. Secondly, the study assessed whether there was an association between substance use and multiple partnerships as well as between substance use in the past month and regular condom use in the past month. Having controlled for substance use, we investigated whether orphaned youth were at increased risk of having had more than one partner or using condoms irregularly and if domains beyond the individual influenced risky sexual behavior. Primary Socialization theory and Social Cognitive theories informed the analyses. Primary Socialization theory postulates that bonds between families, schools, and peers are a significant influence on the behavior of youth, while Social Cognitive theories recognize that social environments affect youth behavior directly but also influence the formation of individual strengths and weaknesses which, in turn, more directly inform adolescent behavior. The hypotheses included that a) factors beyond the individual would be associated with substance use and sexual risk behavior, with peer factors expected to be associated with substance use and school and family factors with risky sexual behaviors b) having controlled for all factors, orphaned youth would be at increased risk of alcohol and drug use, c) substance use would be positively associated with risky sexual behavior,

d) controlling all factors, orphaned youth would be more likely to engage in sexually risky behavior and e) males would be more likely to engage in risky behavior, compared with females.

The study was conducted through two sets of analyses. The first assessed whether orphaned youth were at increased risk of substance use and examined if factors, contained within 5 domains (individual, peer, school, family, and community), were associated with alcohol consumption, having been drunk in the previous month, or ever having used drugs, for all youth. This analysis found that paternal and double orphaned males were at increased risk of alcohol use and that paternally orphaned females were at increased risk of drug use, despite controlling for a wide array of factors. Apart from the individual domain, youth were most influenced by factors within the family and community domains. Family factors were primarily associated with female substance use while males were more influenced by community factors.

The second analysis considered how substance use influenced risky sexual behavior among youth; whether, having controlled for substance use, orphaned youth were at any increased risk of having multiple partners or having used condoms irregularly in the previous month, and whether factors in domains beyond the individual were associated with risky sexual behavior. As we had hypothesized, the analysis found that lifetime use of alcohol or drugs was significantly associated with youth who had more than one sexual partner. Contrary to our hypothesis, substance use in the previous month was not associated with past months' condom use. However, compared with non-orphans, maternally orphaned females were more likely to have had more than one life time sexual partner, and (in preliminary analysis) paternally orphaned males had greater odds of having had more than one partner in the previous year. All orphaned males were more likely to have used condoms irregularly. Paternally orphaned females, who had been at greater risk of substance use were not found to be at greater risk of either sexual risk outcome.

The finding that substance use is related to certain risky sexual behaviors, even when controlling for a large number of factors indicates that programs which address high risk sexual behavior and HIV, should also address youth substance use behavior. The increased risk of orphaned youth (compared with non-orphans) to both substance use and high risk sexual behavior, also remained despite a wide array of control variables, confirming findings from other studies that the relationship between orphan status and risk behavior is not fully mediated by external factors. It may be that factors such as stress and anxiety, found to influence risky behavior in adolescents, are even more important than more tangible or readily measured factors in orphaned youth behavior, and future studies should address these psycho-social factors.

Although maternally orphaned females were more likely to have multiple sexual partners, compared with non-orphans, the paternal orphan sub-group was most often associated with both substance use and sexual risky behavior. As paternal orphans were the largest sub-group, some differences may have been notable which could not be assessed in the smaller sized sub-groups. However, paternal presence may simply be more important for male youth in general, and for males and females in the context of behavior such as substance use. Paternal absence may be associated with reduced household resources and increased stress, thereby contributing to youth substance use. As in most cultures, parents are more likely to influence their same sex children's sexual behavior and maternally orphaned females, more so than males, may be particularly affected by the absence of their mothers when it comes to sexual behavior.

Findings on orphans point to a number of research and programmatic needs. We hypothesized that orphaned youth would be more likely to engage in risky behavior and found that some sub-groups of orphans were more likely to use alcohol or drugs and to have greater numbers of partners. But this was not true of all orphaned youth. Being an orphan does not necessarily imply vulnerability, and it is still not clear why some orphaned

adolescents appear to be at increased risk of health compromising behaviors while others are not. There is value in continuing to try to separate orphan sub-groups when possible because different groups appear to be at risk of different behaviors. Information on these sub-groups may also be useful for other youth. The vulnerability of paternal orphans, for example, indicates that research may be needed to consider the 40% of South African households headed by females. Depending on how involved absentee fathers are, youth in female-headed households may face some of the same risks that paternal orphans do. Orphaned youth have also to date, almost always, been compared with non-orphaned youth except in some analyses of financial well-being. It may be helpful to compare orphan sub-groups with one another when studying risky behavior. Comparing orphan sub-groups with each other may help identify factors or circumstances which contribute to enhanced risk in some sub-groups, while others are protected. This would permit programming to be directed more specifically. Lastly, male and female orphaned youth are at increased risk of different behaviors and both research and interventions need to take some of those differences into consideration.

While we had expected non-individual factors to be associated with substance use, we hypothesized that peer factors would be significant, but did not find them to be. This is very possibly due to the types of peer measures available in the survey. We did find that factors in family and community domains influenced substance use behavior, with females more influenced by family factors and males by community factors. The differences between males and females again indicate that future research and programs directed at youth may need to be structured differently for females versus for males, among non-orphaned youth as well as among orphaned youth. The individual domain continued to exert influence on substance use behavior and, contrary to our expectations, it remained the primary domain influencing risky sexual behavior, when substance use was controlled for. It is likely that the influence of more

distal factors is mediated through the more proximal individual factors when it comes to sexual behavior. On the other hand, factors within non-individual domains most consistently associated with risky behavior were factors such as whether youth had traveled out of town, whether they attended street parties or were involved in faith communities, and whether they were monitored or supervised by parents. While the factors were grouped in different domains, they all speak to venues, and access to venues, as being significant in the behavior of youth. More specific measurement of factors within school, peer, family, and community domains as well as more precise measures of substance use would help make associations, or the lack thereof, more clear. We continue to need research to identify how distal and proximal factors are related to each other in the pathways which lead from substance use to sexual risk taking among all youth in this region, if programs and policies directed at vulnerable youth are to be successful.

Limitations and strengths

This study, while addressing important gaps in knowledge of youth, also had some limitations. These included the cross-sectional design which, while allowing associations between variables and outcomes to be established, limited causal inference. Secondly, the survey consisted of self-report data from adolescents, on sensitive subjects. Sensitive subject matter such as risky sexual behavior and substance use has been found to be inconsistent and under-reported by adolescents (Palen, Smith, Caldwell, Flisher, Wegner, & Vergnani, 2008; Percy, McAlister, Higgins, McCrystal, & Thornton, 2005). As the questions focused on past experiences, there is also the potential for recall bias. Thirdly, the issue of temporality with orphanhood is always of some concern, as there was no way to identify time of risky behavior vis-a vis time of orphaning. The findings regarding condom use are less subject to this limitation as the outcome concerns only condom use in the previous month. Lastly, as the

primary focus of the survey was not substance use, questions regarding alcohol or drug use focused on frequency of consumption. It would have been helpful if the measures had included measures of quantity, if questions had established any history of regular substance use, or excess use, in direct proximity to sexual encounter, and if there had been information on substance use norms in families and neighborhoods, and the venues in which youth regularly use substance or engage in risky sexual behavior. Similar limitations existed in regards to variables contained in domains such as peer and school domains. It would have been helpful to have had more information such as how many interruptions an adolescent has had in education, how "connected" they felt at school and to whom they feel connected, what some of the behaviors of their peers were, who they considered to be peers, whether substance use occurs alone or in groups, and what the venues are where youth engage in risky behavior.

However, the study also has a number of strengths. The data came from a very large, national, randomized survey which provided an opportunity to consider behavioral outcomes for youth from a wide variety of backgrounds in a setting of high HIV prevalence and allows findings to be generalized more broadly. Survey questions permitted the identification of maternal, paternal, and double orphan sub-groups. The data allowed examination of not only sexual risk behaviors but of substance use, and the relationship between the two, considering orphaned youth, which had not been done to date. Lastly, the study combined theoretical constructs into domains which added information about non-individual factors associated with risky behavior of youth and identified foci for future research and programming for orphaned, and non-orphaned youth in sub-Saharan Africa.

Appendix : Questions used to create variables for all hypotheses

Table A: Dependent variables

Dependent variables	Questions used	Variable type and Value
Substance use Alcohol use	Q. 6.1 Have you ever had a drink except for religious ceremonies or to sample or taste? If the subject answered "yes" then the following questions were asked: Q. 6.2 In the past month how often did you drink?	Binary: yes/no Categorical 1= none in past month 2= daily 3= several times a week 4= once a week 5= once per month
Having been drunk in the previous month	Q. 6.3 Have you been drunk in the past month?	Binary: yes/no
Drug use (ever)	Q. 6.5 Have you ever used any drugs to make you feel high?	Binary: yes/no
Multiple partnerships	Q. 3.24 How many different people have you had sexual intercourse with in the last 12 months? [note: sex is defined as anal or vaginal sex]	Continuous
Regular condom use with up to 3 partners in the previous month	Q. 3.26.11 On average how often do you/did you use condoms with your first sexual partner [question was used for those who had more than one lifetime partner] For those who've had more than one lifetime partner AND had sex in the last 12 months: Q. 3.39 On average how often do you/did you use condoms with _____X 1, 2, 3_____ [questions ask about last 3 partnerships in last year]	Both are Categorical: 1= always 2= more than half the time 3= half the time 4= less than half the time 6= never

Table B. Independent Variables

Variable	Questions used	Variable type and value
Orphan status	Q. 8.18 Is your father alive Q. 8.21 Is your mother alive	Binary: yes/no
Substance use Alcohol use (ever and past month)	Q. 6.1 Have you ever had a drink except for religious ceremonies or to sample or taste? If the subject answered "yes" then the following questions were asked: Q. 6.2 In the past month how often did you drink?	Binary: yes/no Categorical 1= not once in the past month 2= daily 3= several times a week 4= once a week 5= once a month
Having been drunk in the previous month	Q. 6.3 Have you been drunk in the past month?	Binary: yes/no
Drug use (ever)	Q. 6.5 Have you ever used any drugs to make you feel high?	Binary: yes/no
Drug use (past month)	Q. 6.8 In the past month how often did you take these (list of illegal) drugs?	Categorical 1= not once in the past month 2= daily 3= several times a week 4= once a week 5= once a month
Individual domain		
Life control	Q 2.3 Please say which statement comes closest to how you feel:	Binary: 1= I mostly find that things just happen in my life 2= I usually feel that I control what happens to me in life
Life goals or options	Q. 4.25.1 I have long range goals for myself Q. 4.25.2 I think I will have many opportunities in life Q. 4. 25.3 I know what I want out of life Q. 4.25.4 I have a good idea of where I am headed in the future	Binary: agree/disagree
Perceived vulnerability to HIV	Q. 4.7 What do you think your chances of getting HIV/AIDS are ?	Categorical: 1= none 2= small 3= moderate 4=great to 5=already know status
Self efficacy for condom use	Q. 4.30.2 Would you be able to use a condom every time you have sexual intercourse? Q. 4.30.4 Would you be able to refuse to have sex if your partner will not use a condom? Q. 4.30.5 Would you be able to talk about using condoms with your partner?	Binary: yes/no Binary: yes/no
Travel out of town	Q. 8.24 In the last six months did you make any trips of more than one night outside of this area?	Binary: yes/no
Peer domain		
Peers as sources of information and knowledge	Q. 2.91 From which one source have you learned the most about each of the following: romantic or love relationships, dealing with pressure to have sex, sexual assault and abuse?	Binary: one option is chosen, all others are considered 0

Variable	Questions used	Variable type and value
		Options include: community members, neighbors, parents, school, spouses, etc. but also included options used for this variable: friends, boyfriend/girlfriend. Family members or siblings were not included.
	Q. 4.14 Have you ever talked to anyone else, other than your parents or guardians about HIV/AIDS?	
	Q. 4.15 If yes, who have you talked to?	Binary: yes/no
Perceived peer pressure to have sex	Q. 4.27 How much pressure do you get from your friends to have sexual intercourse?	Options are the same as above. 1= no pressure 2= not much pressure 3= Some pressure 4= a lot of pressure Variable created: no=no or not much pressure versus yes= some or a lot
School domain Attendance and achievement	Q. 8.1 What is the highest grade you have passed at school:	Was a continuous variable divided into 0-6 years, completion of primary school, 8 or more years
Currently in school	Q. 8.2 Are you currently in primary or secondary school?	Binary: yes/no
School domain (cont'd) Employment	Q. 8.6 What is your main activity/ vocation	Options included full or part time student, full or part time employment, self employed or unemployed
School as source of information or knowledge	Q. 4.1 Have you ever heard of HIV/AIDS?	Binary: yes/no
	Q. 4.2 From which one source have you learned the most about HIV/AIDS	Options include: community members, neighbors, parents, spouses, etc. also included the option: teacher, classmates, classroom, school
	Q 4.14 Have you ever talked to anyone else, other than your parents or guardians about HIV/AIDS?	Binary: yes/no
	Q. 4.15: If yes, who have you talked to	See options listed above
Family domain Family communication	Q. 2.91 From which one source have you learned the most about each of the following: romantic or love relationships, dealing with pressure to have sex?	Options include: parents, mother, father, guardians, other relatives
	Q. 4.2 From which one source have you learned the most about HIV/AIDS	As above
Monitoring and supervision	Q. 4.12 Have you ever talked to your parents or guardians about HIV/AIDS?	Binary: yes/no
	Q. 8.17 Do you have to be home every evening by a certain time?	Binary: yes/no Categorical: 1= never 2=rarely 3=sometimes 4=usually 5=always
Living with a guardian	Q. 8.15 Do your guardians know where you are when you go	

Variable	Questions used	Variable type and value
	out? Q. Do you have a parent/guardian (person older than 18) staying with and taking care of you at home	Never/rarely= no; Sometimes/usually/ always= yes Binary: yes/no
Domain of community		
Community closeness	Q. 2.5 In some communities people know and talk to each other while in other communities there is not this sense of closeness. How close do you feel to other people in this community?	Categorical: 1= very close 2= somewhat close 3= not too close 4= not close at all
Faith service attendance	Q. 8.11 How often do you attend religious services, aside from weddings or funerals?	Categorical: 1=more than weekly 2= once a week 3= 1-2x /month 4= a few times a year 5=never
Youth group attendance in the past month	Q. 2.86 In the 30 days how often have you participated in a youth group (sports, musical or theater group)	Categorical: 1=daily 2= almost every day 3= once or twice a week 4= once or twice last mo. 5= never in last month
Street-party attendance	Q. 2.87 In the last month how often have you gone to a street party or bash or nightclub	Categorical: 1=daily 2= almost every day 3= once or twice a week 4= once or twice last mo. 5= never in last mo

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