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HIV IN SOUTH AFRICAN YOUTH:

RELATIONS WITH PARENTING QUALITY AND EXECUTIVE FUNCTIONING

by

CHRISTINA H. SALAMA

Under the Direction of Dr. Lisa Armistead and Dr. Mary Morris

ABSTRACT

Black South Africans account for a majority of HIV cases in South Africa, highlighting the need for greater understanding of risks specific to this group. Within the HIV prevention and risk literature, little information exists regarding the familial and neuropsychological contributions to HIV risk in youth. The current study addressed this gap. In a group of black South African parent-child dyads, the researchers investigated the independent and interactive contributions of parenting quality and executive functioning in the prediction of HIV risk. Child report of relationship quality was negatively associated with risky sexual attitudes and externalizing behaviors. Parent report of parental monitoring/involvement was negatively associated with child pre-coital behaviors. Cognitive inflexibility interacted with child report of parental monitoring/involvement in its relation with externalizing behaviors. Results indicated that parenting may protect black South African youth with respect to HIV risk, and that executive functioning may play an indirect role in this relationship.

INDEX WORDS: HIV, South Africa, Adolescents, Risk behavior, Executive functioning

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CHRISTINA H. SALAMA

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in the College of Arts and Sciences

Georgia State University

2011

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2011

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December 2011

DEDICATION

This thesis is dedicated to my uncle, who always supported and encouraged my academic pursuits. I know that he would be proud of my accomplishments, and I thank him for his enduring love and generosity.

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I would like to express my gratitude to Dr. Lisa Armistead and Dr. Mary Morris for being outstanding mentors. Their constant encouragement, support, and invaluable suggestions made this work successful. They have challenged me to broaden my thinking and contributed to the continued development of my research skills. They have been everything that one could want in an advisor. I am also deeply indebted to my third committee member, Dr. Lindsey Cohen, for his time and effort in reviewing this work.

I am deeply indebted to my parents and family, who have consistently supported me throughout my training and beyond. They have always believed in me and taught me to never waiver in the pursuit of my goals. I thank them for their unending love and encouragement.

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1 INTRODUCTION

1.1 HIV in South Africa

With approximately 5.7 million people infected with HIV, South Africa is home to the largest prevalence worldwide (UNAIDS, 2009). Black South Africans account for a majority, 79%, of this prevalence (Shisana, 2009), with rates among youth being particularly alarming. Prevalence of HIV for 15-19 year old males (2.5%) doubles by ages 20-24 (5.1%), and female HIV prevalence triples from ages 15-19 (6.7%) to ages 20-24 (21.1%) (Statistics South Africa, 2009). The primary mode of HIV transmission across age groups is heterosexual sex (UNAIDS, 2009). Factors contributing to the risk associated with heterosexual sex include inconsistent condom use, intergenerational sex, and multiple sexual partners (Kalichman, 2005; Kalichman, 2007; Magnani, 2003; Pettifor et al., 2004; Simbayi et al., 2006). The prevalence of HIV among South African youth warrants continued probing of HIV risk and protective factors.

Despite adequate knowledge of HIV and its risk factors, black South African youth continue to engage in high risk sexual activity, such as unprotected sex (Simbayi et al., 2005). The average age of sexual debut is 16.7 years, and as youth begin to experiment sexually at a young age and with multiple partners, they become uniquely vulnerable to HIV infection (Abrams, Abraham, Spears and Marks, 1990). Identification of factors contributing to vulnerability prior to the onset of sexual behavior may be particularly useful. Interventions aimed at preventing early onset of sexually risky behaviors may be more effective than aiming to decrease or eliminate behaviors already entrenched (Miller, Levin, Whitaker, & Xu, 1998). Therefore, we focused attention on youth aged 10 to 14. Because of the focus on youth who are not yet sexually active, we explored a range of associated outcomes.

South African youth, aged 10 to 14, have not typically had vaginal or anal intercourse. However, factors proximal to intercourse (e.g, attitudes about sex and pre-coital behaviors) or associated with sexual activity (e.g., externalizing behaviors) are not uncommon among 10 to 14 year olds. We relied on the HIV youth risk literature and Jessor and Jessor's Problem Behavior Theory (1977) to guide the selection of youth outcomes to consider. Researchers often consider both attitudes about sex (Meier, 2003) and pre-coital behaviors, such as dating and fondling (Hansen, Paskett, & Carter, 1999; Smith & Udry, 1989), to be associates of more advanced sexual behavior. Previous research examining U.S. youths' HIV risk has demonstrated that attitudes about sex explained a significant amount of the variance in risky sexual behavior, such as multiple partners (Basen-Engquist & Parcel, 1992) and inconsistent condom use (Richard & van der Pligt, 1991). In the South African context, studies examining relations between sexual attitudes and HIV risk indicated that youth who believed condoms get in the way of sex or that their partners disliked using condoms also had higher HIV risk index scores (Simbayi et al., 2005), with the HIV risk index including number of sexual partners, previous diagnosis of a sexually transmitted infection, and unprotected sexual exposure. With respect to pre-coital behavior, Smith and Udry (1985) found significant relations between sexual intercourse and pre-coital activity, such as kissing and fondling, in a two-year longitudinal study of children who were initially between the ages of 12 and 15. Children engaged in pre-coital behaviors at the beginning of their study were 50% more likely to have engaged in intercourse later in the study. In summary, researchers have conceptualized that attitudes and pre-coital activity are associated with more advanced sexual behavior, which may include HIV risk behaviors for South African youth.

Informed by Problem Behavior Theory, externalizing behaviors were also included in our examination of youth risk. Problem Behavior Theory (Jessor & Jessor, 1977) suggests that HIV risk behaviors may occur as part of a constellation of co-occurring problem behaviors, such as getting in trouble at school, threatening others, and fighting. Jessor argued that risk behavior in adolescents can be characterized as a syndrome and more likely includes a pattern of behaviors that co-occur, such as risky sexual behavior and general delinquency. Accordingly, adolescents who are defiant and aggressive may also be likely to engage in sexual risk-taking behaviors, such as unprotected sex or having sex with multiple partners. Across U. S. samples (e.g., Bachanas et al., 2002; Doljnac & Zimmerman, 1998; Nyamathi et al., 2000), researchers have linked externalizing behaviors to increased HIV risk. Similarly, South African young men aged 15 to 26 who engaged in aggressive behavior, such as intimate partner violence, also reported more HIV risk behaviors, such as having multiple partners, transactional sex (Dunkle, Jewkes, Nduna, Levin, Jama, Khuzqayo, Koss, & Duvvury, 2006), and inconsistent condom use (Hoffman et al., 2006), than those youth who reported limited violent behavior. Consistent with previous HIV risk literature and Jessor's theory, and due to the age of the sample, our assessment of HIV risk encompassed multiple outcomes, including attitudes about engaging in sexually risky behaviors, pre-coital sexual activity, and externalizing behaviors. By examining behavior prior to sexual debut, we aimed to help determine protective factors that may serve as targets for HIV prevention.

1.2 Parenting Quality as a Protective Factor for Youth HIV Risk

Despite extremely high prevalence of HIV in South Africa, little research has examined factors that protect youth. Given the important role that families play in the lives of youth (Tinsley et al., 2004) and the evidence implicating the importance of parenting, we examined

associations between parenting and youth outcomes. In U.S. research, several studies implicate positive parenting processes in youth outcomes. In particular, two dimensions of parenting, the parent-child relationship and parental monitoring, have consistently emerged as protective with respect to children's general adjustment (Lamborn, Dornbusch, & Steinberg, 1996), in addition to sexual debut and other sexual activity among youth (Kotchick et al., 2001). Given the limited research with South African, or even African, samples, we considered the U.S. research, turning first to the role of the parent-child relationship. Parent-child relationship quality encompasses, among other factors, communication and interaction comfort between parent and child. Within the U.S., parent-child relationship quality appears to affect youth attitudes about sex, sexual behaviors and the occurrence of externalizing behaviors across multiple cultural groups. Kotchick et al. (2001) studied Latino and African American family relationships and demonstrated an inverse relationship between communication and sexual behavior, in which as positive communication increased, adolescent sexual activity and number of partners decreased (Kotchick et al., 2001). Communication between parents and children also impacted adolescent attitudes about sex in a sample of Caucasian youth, such that better communication predicted more conservative sexual attitudes (Tubre, 2008). U.S. investigations (Harnish et al., 1995, Kanti et al., 2008) have also demonstrated linkages between the quality of the parent-child relationship and delinquency or externalizing behaviors. However, only one study examined these relationships among South African families. Palin et al. (2009) found that better parent-child relationship quality was associated with lower reports of externalizing behaviors in South African adolescents with mothers who have HIV. The link between parent-child relationship quality and risk behavior has been well-established in a U.S. context. However, parent-child relationship quality may or may not be relevant to the outcome of adolescent HIV

risk in a South African context. Despite its potential protective role, this variable has not been well considered among South African samples, a gap addressed by the current study.

Parental monitoring or supervision of children is also a well established protective factor for U.S. youth (Day & Padilla-Walker, 2009; Li, Fiegelman, & Stanton, 2000; Prado et al., 2007). Findings by DiClemente et al. (2001) indicated that parental monitoring influenced sexual risk behaviors, in that as perceived parental monitoring increased, African American adolescent females aged 14 to 18 were more likely to use condoms at their most recent sexual intercourse and were less likely to test positive for a sexually transmitted disease. Youths' perceptions of parental monitoring played a protective role longitudinally as well. Li, Stanton, and Feigelman (2000) found that over the course of four years, there was an inverse relationship between urban, African-American youths' risk behavior (unprotected sex, drug use, and drug trafficking) and perceived parental monitoring. Similarly, Laird et al. (2008) demonstrated that a sample of U.S. youth who reported more parental monitoring also reported less deviant behavior over time between the ages of 12 and 16. With respect to adolescent sexual attitudes, the literature demonstrated a negative relationship between parental monitoring and sexual attitudes, such that stricter monitoring was related to less permissive sexual attitudes regarding condom use, number of partners, and dating (Romer et al., 1994; Tubre, 2008). U.S research provides support for the importance of parental monitoring of children to the regulation and prevention of sexual and other risk behaviors associated with HIV. However, research has yet to consider this component of parenting and its relation to South African youths' functioning.

Parental monitoring in the U.S. literature is primarily defined as parents' knowledge of where their children are, who they are with (when not with a parent) and the activities in which their children are engaged. Formative work for the current study considered the concept of

monitoring among families similar to those participating in this research. South African parents, youth, and child welfare personnel indicated that monitoring should be conceptualized more broadly to include parental involvement in children's activities, such as school functions, daily chores, and extracurricular interests. We considered parental involvement in these activities along with monitoring, hereafter referred to as monitoring/involvement and examined how this component of parenting may be a protective factor against risk behavior outcomes.

In this investigation, two components of parenting quality, the parent-child relationship and parental monitoring/involvement were anticipated to be environmental factors involved in youth HIV risk. Beyond the examination of these environmental (parenting) factors, we considered biological or neuropsychological components of adolescents' decision-making process for engaging in risk behavior (Boyer, 2006; Moffitt & Henry, 1989). Including adolescents' executive functioning in a model of predicting risk offers an opportunity to investigate the manner in which environmental and cognitive factors interact to predict South African youth outcomes.

1.3 Executive Functioning and Youth HIV Risk

Miyake (1999) defined executive functioning as a set of neuropsychological processes important for goal-directed behavior, including planning, abstract thinking, problem solving, and inhibition. Previous researchers have suggested that executive functioning is primarily associated with the pre-frontal cortex region of the brain. In adolescents, Casey et al. (2008) suggested that risky behavior may reflect the contributions of areas of the brain responsible for increased emotional responsiveness (nucleus accumbens and limbic system) and executive functioning (pre-frontal cortex). Van Leijenhorst et al. (2010) demonstrated support for the association between risky decision-making and the ventral medial pre-frontal cortex, such that

adolescents who made more risky decisions, accompanied by higher reward, also showed activation in the ventral medial pre-frontal cortex.

Significant relations between cognitive measures of executive functioning and some types of risk-taking behaviors (e.g.., delinquency and aggression) have been demonstrated in several U.S. studies. In a group of adolescents aged 11 to 13 years with a comorbidity of anti-social behavior and attention-deficit disorder, Moffitt and Henry (1989) found deficits in sustained attention and shifting (Trails A and B; Reitan, 1958), inhibition (WISC-R Mazes; Wechsler, 1974), and visual organization and planning (Rey-Osterreith Complex Figure Test; Rey, 1941). Similarly, in a study examining neuropsychological contributions to risks for substance use, adolescents aged 12 to 15 years with weaker response speed (Symbol-Digit Task; Smith, 1991), cognitive inflexibility (Wisconsin Card Sorting Test, WCST; Heaton et al., 1992), and poor verbal fluency (Controlled Oral Word Association Task, COWAT; Benton & Hamsher, 1978) exhibited more delinquent and aggressive behaviors than those with better scores on these neuropsychological tasks (Nigg et al., 2004). Additionally, Giancola, Shoal, & Mezzich (2001) demonstrated a significant inverse relationship between anti-social behaviors and executive functioning in adolescent females aged 14 to 18 years, such that female adolescents with delinquent, violent, and aggressive behaviors performed more poorly on executive functioning tasks measuring judgment, organization, and planning compared to controls. Giancola, Shoal, & Mezzich (2001) operationalized executive functioning by using a principal-component analysis and calculated a composite score reflecting performance on the Porteus Maze Test (Porteus, 1965), Stroop task (MacLeod, 1991), Vigilance task (Schneider & Detweiler, 1987), Motor Restraint task (Parsons, Tarter, & Edelberg, 1972), WISC-R Picture Arrangement Test (Wechsler, 1972), WISC-R Block Design Test (Wechsler, 1972), and WISC-R Object Assembly

Test (Wechsler, 1972). These studies used broad conceptualizations of executive functioning, which included mostly spatial and nonverbal measures of planning, inhibition, and shifting and demonstrated that these measures related separately, or in the context of a composite score, are associated with delinquent and aggressive behaviors in U.S. adolescents. However, evidence for a direct relationship between executive functioning and youth risk behavior has been inconsistent.

In contrast to the afore-mentioned studies, other investigations failed to support a direct relationship between executive functioning and risk behavior. Fairchild et al. (2009) found no differences between adolescents who did and did not meet criteria for Conduct Disorder on a measure of abstract reasoning and cognitive inflexibility (WCST; Heaton et al., 1993). Executive functioning also was unrelated to risky decision making (Fairchild et al., 2009) and to risky behaviors such as fighting and gambling (Romer, Betancourt, Gianetta, Brodsky, Farah, & Hurt, 2009). Although Romer et al. (2009) operationalized executive functioning using several measures of working memory, cognitive control, and reward processing, only working memory played an indirect role in aggressive behaviors, by way of its relation with a measure of trait impulsivity. Overall, these studies suggested that cognitive measures of executive abilities did not play a direct role in the outcome of risky behaviors, such as aggression and delinquency.

Findings across studies examining the relations between executive functioning and youth risk behavior have been inconsistent. Potential explanations for the inconsistencies include variations in the conceptualization of executive functioning, differences in outcome measures or operationalization of risk, and demographic differences in samples. Varying definitions of executive functioning, both conceptually and operationally, may be responsible for inconsistent evidence supporting a direct relationship with risk behavior. Studies which define executive

functioning more broadly, including factors such as impulsivity, inhibition, and working memory, may result in more robust findings (Giancola, Shoal, & Mezzich, 2001; Moffitt & Henry, 1989). Related, studies that use a factor analyzed composite of multiple executive functioning measures (Giancola, Shoal, & Mezzich, 2001) may demonstrate more robust effects of executive functioning, in contrast to studies that assess the contributions of multiple individual measures (Fairchild et al., 2009; Romer et al., 2009).

Variations in outcomes considered may be another source of disparity between studies with evidence for and against a direct effect of executive functioning. For example, Moffitt and Henry (1989) compared children with anti-social disorders with and without comorbid attentional disorders, and found that only children with both anti-social and attention-deficit disorders demonstrated executive functioning deficits. The attentional deficits in children with anti-social disorder were likely responsible for the observations of executive dysfunction in this sample. Finally, in those studies with non-clinical participants recruited from the general community (e.g., Romer et al., 2009), individuals may not have exhibited a comparable amount of externalizing behaviors and executive functioning deficits as adolescents recruited from the juvenile justice system or otherwise labeled as delinquent (e.g., Giancola, Shoal, & Mezzich, 2001; Moffitt & Henry, 1989). In summary, research supporting a direct link between executive functioning and adolescent risk behavior is equivocal.

Some studies have suggested that executive functioning may have an indirect effect on youth risk behavior, either through its relation with or in combination with another predictor of risk. With respect to the former, Romer et al. (2009) suggested that executive functioning may be associated with risky behavior in preadolescents through impulsivity. Specifically, they used the Counting Stroop (MacLeod, 1991) to measure executive functioning and found that scores on

this measure were associated with impulsivity, but not directly related to risky behavior. Rather, impulsivity was associated with risky behavior. Gonzalez et al. (2005) also provided support for executive functioning interacting with another variable in its association with risk behaviors in a sample of African American men living with HIV who were also substance dependent. In their work, the relation between sensation seeking and risky sexual behaviors (e.g., multiple partners and inconsistent condom use) depended on the level of executive functioning performance. The studies cited above have explored the interactions of executive functioning with other individual variables (e.g., impulsivity, sensation seeking). However executive functioning might also interact with environmental variables to predict risk. Evidence for a combined effect of neurobiological variables and parenting on the development of adolescent behavior problems has been previously demonstrated. Arseneault, Tremblay, Boulerice, and Saucier (2000 as cited in Moffitt & Caspi, 2001) reported that chronic aggression from childhood to adolescence was best predicted by the combined effect of infant-nervous system development, poor parenting, and social adversity. Also, Raine et al. (1996) suggested that a combined effect of neuromotor deficits at age 1 and poor parenting better predicted violent behavior in delinquent youth than just one of these factors in isolation. These studies suggest that models that incorporate both biological and environmental variables may be useful in predicting risky behavior. However, the neurobiological variables that were chosen for these studies emphasized early neurodevelopment rather than neurocognitive constructs such as executive functioning, and the outcomes measured were distal in time to these early potential predictors. The relations between parenting and child executive functioning with respect to early adolescent outcomes have not been addressed concurrently using neurocognitive measures.

There is no literature available which considers the direct or indirect role of executive functioning on behavioral outcomes for South African youth. In the current study, the interactive effects of executive functioning and parenting were examined. Two aspects of executive functioning, abstract reasoning and cognitive inflexibility, as measured by the Wisconsin Card Sorting Test (WCST; Heaton, 1993) were considered. Evaluating abstract reasoning and cognitive inflexibility as specific components of executive functioning involved in problem solving allows for a more targeted examination of the neuropsychology of risky behavior and young adolescents' decision-making process. Abstract reasoning allows an individual to address a problem or challenge by thinking broadly, instead of concretely, which may result in more alternative explanations or solutions. Similarly, cognitive inflexibility limits the generation and use of multiple solutions. An individual with cognitive inflexibility may exhibit difficulties in forming concepts, learning from mistakes, and modifying unsuccessful strategies (Milner, 1963). The capacity for problem solving, as indicated by level of executive functioning, may be important for self-regulation and emotion management as children develop and subsequently encounter situations of risk that may require such critical thinking (Compas, 2009). These abilities may help adolescents generate alternate ideas and facilitate employing these ideas during potential risk behavior situations, such as condom use negotiation and multiple partner activity.

1.4 Summary and Hypotheses

As part of a parent study based in the Langa township outside of Cape Town, we investigated the contributions of parenting and executive functioning to HIV risk in youth aged 10 to 14. In the parent study, "HIV Risk Reduction for South African Youth: Creating a Family-Based Intervention," investigators from Georgia State University and Stellenbosch

University Medical School, in collaboration with community stakeholders, developed and piloted a family based HIV prevention intervention that sought to improve parenting and communication within black South African families, thereby reducing risk among youth. Assessment and intervention development incorporated community input and participation to address the specific cultural needs of the Langa community.

Various components of parenting quality may impact the choices that South African youth make in regard to sexual attitudes, pre-coital behavior and externalizing problems, all of which have been linked to HIV risk. In addition, executive functioning may be directly or indirectly associated with aspects of HIV risk. Specifically, the interaction of these two processes may be integral to explaining risk in youth and contribute to prevention efforts within this high-risk, yet understudied population. In the current study, we investigated the role of two aspects of parenting (relationship quality and parental involvement/monitoring) and executive functioning (abstract reasoning and cognitive inflexibility) in the HIV risk of black South African youth. Based on previous HIV risk research and Problem Behavior Theory, HIV risk included youth self reports of sexual attitudes, pre-coital behaviors, and externalizing behaviors.

(1) We hypothesized that better quality parenting and executive functioning would be associated with less HIV risk in each of the three risk domains (i.e., sexual attitudes, pre-coital behaviors, and externalizing behaviors).

(2) We further hypothesized that executive functioning would moderate these relationships, in that children with higher abilities in abstract reasoning and cognitive flexibility who also experienced better quality parenting would demonstrate the lowest reports of HIV risk.

2 Method

Data were obtained from Imbadu Ekhaya (the community-based name for the aforementioned parent research project), a study launched to develop and pilot an HIV prevention intervention through a parenting skills workshop for South African caregivers. The current study only utilized data collected at baseline from parents and children.

2.1 Participants

Participants were recruited by two project staff members and a community outreach worker from the Langa office of the Cape Town Child Welfare Society (CTCWS) over the course of six months. All participants resided in the Langa Township in Cape Town, South Africa. The study was endorsed by the Civic Association in Langa and approved by the GSU Institutional Review Board and Stellenbosch University's Ethics Committee. Recruitment staff visited homes door-to-door, inviting families who met study inclusion criteria to attend one of three informational meetings.

Based on the aforementioned formative work and the over-arching South African context, only female caregivers were included in this research. Families who participated in focus groups prior to this study consistently reported that fathers played a limited role in child rearing. Even when fathers were present in the home, mothers assumed responsibility for child care and most household chores (Zimmerman, Tarantino, Armistead, Cook, Skinner, & Toefy, under review). Moreover, evidence from South African literature (Barbarin & Richter, 2007) suggested that females were most typically the primary caregivers in Black South African families, likely driven by cultural gender roles, which indicated that women are the primary nurturers in a household, while males were traditionally in the role of protector, provider, and decision-maker.

A total of 106 caregivers attended informational recruitment meetings. Four families were determined to be ineligible, and 102 families enrolled in the study. Inclusion criteria were being the primary caregiver of at least one child between the ages of 10 and 14 with whom the caregiver had lived for at least the previous year; having lived in the target community (Langa) for at least one year; and the ability to participate in assessments and the intervention in either English or Xhosa. When the caregiver was responsible for more than one child in a household between the ages of 10 and 14, recruiters selected the child with the most recent birthday for participation. The primary female caregiver was defined as the adult household member who engaged in the majority of the parenting duties for assuring the well being of the 10 to 14-year-old child. For the purposes of the current study, power analysis for regressions involving interactions indicated that a sample total of 77 participants would be adequate to achieve 0.80 power and 0.15 effect size, with an alpha of 0.05.

2.2 Procedures

The study was implemented in rental space within the Langa township. Subsequent to informational meetings, interested caregivers and youth were scheduled for the baseline assessment, which was preceded by the consenting process. Project staff consented and assented each parent and child dyad together. Consent/assent forms were available in English and Xhosa, with participants choosing the language of administration, and all were read and explained to participants to mitigate literacy concerns. Consent/assent forms clearly indicated that parents did not have access to children's responses and vice versa.

Caregivers and children were separately assessed using audio-computer assisted interviews (A-CASI) to ensure privacy of responses. Participants selected whether the computer would verbally present interview items in English or Xhosa, while simultaneously presenting the

written version of each question in both languages. Parents were provided with R70 (approximately $9) in grocery vouchers to off-set costs associated with their completion of the baseline assessment (e.g., childcare, transportation). The children received a small toy or other appropriate gift (valued at approximately R20 or $3) in appreciation for their participation. The baseline assessment required approximately one hour for caregivers and 30 minutes for children to complete. Caregivers provided information about family structure, socioeconomic status, and parenting quality. Information on parenting quality, outcome variables, and executive functioning was obtained through child report and neuropsychological testing.

2.3 Measures

Several of the measures chosen for this study have previously been used with South African samples demographically similar to those enrolled in the current study. Where appropriate South African measures were not available, formative work resulted in modification of U.S.-based instruments for the parents and children. Specifically, we modified the measures considerably to address the sample's cultural context. Modifications were informed by input from South African researchers, family service providers, and parents and youth living in the target area. Subsequent to this formative work, the measures were translated from English to Xhosa and back, using the back-translation technique by Brislin (1970).

2.3.1 Demographic information. Socio-economic status was evaluated based on family housing. Caregivers reported housing type based on the following categories: none/homeless, shack, hostel, room/garage, flat, or brick house. Demographic information regarding child age, education, and gender, as well as caregiver ethnicity and age was also collected (see Table 1).

2.3.2 Outcomes associated with HIV risk. Due to anticipation of a low occurrence of actual sexual behaviors among South African early adolescents, we examined attitudes and behaviors demonstrated to be associated with sexually risky behavior for many youth (Treboux, 1990). Sexual attitudes and behaviors were assessed through measures developed for use with a previous U.S. family-based HIV prevention intervention (Forehand et al., 2007). Children were asked about their attitudes regarding various aspects of sexual behavior and sex education. Sixteen items asked about three different areas: attitudes about people having sex (in general), attitudes about the teen him/herself having sex, and attitudes toward birth control, condoms, and responsibility. Sample items from each domain included, "People should have sex only if they are married," "I think it is OK to have sex as long as I protect myself from STDs and pregnancy," and "I think I should use condoms if I have sex." Item responses were on a Likert-type scale with three options ranging from "Not at all true" with a value of 0 to "Very true" with a value of 2. Items were reverse scored as needed and averaged so that higher scores indicated riskier sexual attitudes, and scores could range from 0 to 2. The results of an exploratory factor analysis revealed three possible factors with an eigenvalue greater than 1. However, the scale items loaded much higher with a one factor scale, with an eigenvalue of 6.98 and a coefficient alpha of 0.93. Therefore, based on the high internal consistency of the complete scale and high eigenvalue, a one factor interpretation of the scale as measuring riskier sexual attitudes was used.

We included a series of questions that assessed pre-coital behaviors (e.g., involvement in sexually possible situations), and questions were gated such that advanced sexual activity was queried only if earlier questions were answered affirmatively. Items were answered dichotomously (yes/no) and included questions such as "Have you ever held hands with a boy/girl?", "Have you ever kissed a boy/girl?", and "Have you ever willingly touched a

boy's/girl's private parts?" A majority of the participants endorsed only pre-coital behaviors with very few reporting advanced sexual activity. Specifically, only 3.8% of the sample reported having had vaginal intercourse; therefore, only items asking about pre-coital behaviors were included in the final measure of sexual behavior. Thus, the final measure of pre-coital behavior consisted of nine items and scores could range from 0 to 9.

Externalizing behavior was measured by items from the Child Behavior Checklist Youth Self-Report (CBCL; Achenbach, 1991). This self-report measure has been previously used with children in South Africa (Barbarin & Richter, 2001; Cluver et al., 2007; Palin et al., 2009). Likert-scale responses offered three potential responses, ranging from "Not at all true" to "Very true." Using confirmatory factor analysis of the externalizing behavior items in the CBCL, Palin and colleagues (2009) demonstrated reliability with coefficient alpha of 0.88 in a South African sample of children with HIV seropositive mothers. The version of the CBCL used in the current study was modified and included 13 items measuring externalizing behavior. This final measure includes 11 original items from the CBCL and 2 additional items developed by the researchers, in collaboration with South African colleagues and community members. The current sample demonstrated adequate reliability (0.74) with this modified version. Scores could range from 0 to 26.

2.3.3 Parenting. Two components of parenting (relationship quality and parental monitoring/involvement) were considered. Self-report measures completed by both the caregiver and the child assessed the quality of the parent-child relationship (i.e., the Interaction Behavior Questionnaire: IBQ). The IBQ-short form (Robin, 1989) consisted of 19 items and evaluated communication-conflict behavior between a caregiver and child. Responses were dichotomous (yes/no), and were averaged, with total scores ranging from 0 to 1 and higher scores indicating a

better relationship quality between child and parent. Good internal consistency and discriminant validity have been reported in U.S. samples (Prinz et al., 1979; Robin, 1989). The measure has been used in a previous study of black South African mothers living with HIV (Palin et al., 2009). South African collaborators in the current study determined that this construct of parent-child relationship quality did not differ from a U.S. conceptualization, and therefore, the measure was not modified. The current sample demonstrated adequate reliability for both caregivers (0.78) and children (0.78).

Caregivers and children completed the 23-item Inventory of Parental Involvement which assessed parental monitoring/involvement. The measure was adapted and modified from the Inventory for Father Involvement (IFI; Hawkins et al., 2002). Due to the differences between the participants used in developing the IFI and the current project (e.g. culture, parent gender), only 12 items out of the original 35 items were retained in the IPI, and 11 items were created based on feedback obtained during the formative work. The questions asked the frequency with which the caregivers are involved in helping with homework, monitoring school performance, and spending time with children. Furthermore, response options were changed for all items from the IFI. On the original measure, fathers were given a 0 to 6 Likert scale option, ranging from “Very poor” to “Excellent.” For the modified measure, caregivers and children responded to the items using a 3 point Likert scale consisting of “Never,” “Sometimes,” or “Often.” Three questions asked about frequency of involvement using a 4 point Likert scale, which included “Never,” “Once or twice a week,” “About three times a week,” or “Every day or almost every day.” Parents could also indicate that an item was not applicable. Scores could range from 0 to 55. The coefficient alpha of the IPI for this sample was adequate for both the caregiver (0.83) and child (0.86). This is the first known use of the IPI in a South African context. Because the IPI

measures frequency of behaviors, rather than a perception of behavior or experience, a sum score of the items was computed, with greater scores indicating more parental monitoring/involvement.

2.3.4 Executive functioning. Participants completed the computer-based version of the Wisconsin Card Sorting Test (WCST; Heaton, 1993), an executive function measure that assesses abstract reasoning and cognitive inflexibility in response to changing environmental contingencies. This modified version of the WCST consists of four stimulus cards and 64 response cards that depict various shapes (crosses, circles, triangles, or stars), colors (red, blue, yellow, or green) and numbers of figures (one, two, three, or four). The four response cards with the following characteristics appear on the top of the computer screen before the participant in left-to-right order: one red triangle, two green stars, three yellow crosses, and four blue circles. As each new stimulus card appears on the bottom of the computer screen, the participant is then instructed to choose a response card that matches each consecutive stimulus card. The participant is told only whether each response is right or wrong and is never told the correct sorting principle (or category). Once the participant has made a specified number of consecutive "correct" matches to the initial sorting principle (usually to Color), is changed--to Form or Number--without warning, requiring the participant to use the examiner's feedback to develop a new sorting strategy. The WCST proceeds in this manner through a number of shifts in set (i.e., sorting principle) among the three possible sorting categories (Color, Form, and Number). This current study focused only on the categories completed (measuring overall abstract reasoning) and perseverative errors (measuring cognitive inflexibility) components of the WCST. The number of categories completed is a global indicator of the ability to identify abstract concepts

and to maintain and shift cognitive sets in the card sorting process. Perseverative errors are an indication of cognitive inflexibility, with higher scores demonstrating greater inflexibility.

Three prior studies known to the researchers have evaluated performance on the WCST in a South African sample (Meyer, 2005; Powell, 2000; Skuy et al., 2001). However, samples in these studies differ from the current sample with respect to age and ethnicity. Participants in the existing studies were (age) and (ethnicity). Therefore, the researchers determined that it would not be appropriate to compare the current sample to these previous studies. Using established U.S. normative data would also be inappropriate for this sample. Score discrepancies between South African individuals and the U. S. sample on which the WCST was standardized have been reported (Skuy et al., 2001) and are likely a reflection of differences in education, unfamiliarity with concepts, and/or language differences. Therefore, we used raw scores rather than standardized scores in analyses.

3 Results

3.1 Descriptive Statistics

3.1.1 Demographic information. Descriptive statistics for participant demographic variables are displayed in Table 1. A total of 102 caregiver-child dyads were enrolled in the study. Three caregiver-child dyads failed to complete any baseline measures, resulting in 99 caregiver-child dyads participating in the Imbadu Ekhaya parent study. However, 22 children did not complete the executive functioning portion of the baseline assessment. Subsequently, 77 caregiver-dyads were included in these analyses. The ages of the child participants ranged from 10 to 14 (M=11.68, SD=1.44), and 51.9% of the children were male. Caregivers ranged in age from 22 to 74 (M=42.55, SD=11.43). Caregivers reported their ethnicity as follows: 81.8% Xhosa, 11.7% Zulu, 3.9% Sotho, and 2.6% other. Because the majority of caregivers reported

living in a brick house (71.4%), the housing variable was recoded into stable (brick house) and unstable (none/homeless, shack, hostel, room/garage, or flat) housing. This variable served as the indicator of socioeconomic status.

Table 1
Demographic Characteristics of Participants

		Percentage	Mean	Standard Deviation	Range
Age			11.68	1.44	10-14
Gender					
	Male	51.9%			
	Female	48.1%			
Child Years of Education			5.80	1.41	3-9
Caregiver Ethnicity					
	Xhosa	81.8%			
	Zulu	11.7%			
	Sotho	3.9%			
	Other	2.6%			
Caregiver Age			42.55	11.43	22-74
Housing					
	Unstable	28.6%			
	Stable	71.4%			

3.1.2 Study variables. Descriptive statistics for all study variables are presented in Table 2. Evaluation of normality assumptions resulted in a square-root transformation of the WCST perseverative errors score (measuring cognitive inflexibility) to reduce skewness of the distribution.

3.2 Preliminary Analyses

Bivariate correlations among demographic (child age and gender, housing status) and all study variables were conducted and are presented in Table 3. Only age and gender correlated significantly with outcome variables. Housing status, the proxy for socioeconomic status, was not associated with study variables, likely due to the fairly limited variability in this measure.

Older children reported less risky sexual attitudes ($r(77)=-0.37$, $p<.01$) and more pre-coital behaviors ($r(77)=0.31$, $p<.01$). Child gender was significantly correlated with pre-coital behaviors ($r(77)=-0.39$, $p<.01$), while the association between child gender and risky sexual attitudes approached significance ($r(77)=-0.22$, $p=.059$), such that males reported more pre-coital behaviors and riskier sexual attitudes. Child age was also negatively associated with parent report of parental involvement/monitoring ($r(77)=-0.23$, $p=.05$), such that parents with older children reported less involvement/monitoring with them. Child age and gender were not significantly associated with any other study variables.

Table 2
Descriptive Statistics for Study Variables

Variable	Mean	Standard deviation	Minimum	Maximum
Parent-Child Relationship Quality, Child Report (Child IBQ)	0.75	0.18	0	1
Parent-Child Relationship Quality, Parent Report (Parent IBQ)	0.69	0.20	0.11	1
Parental Involvement, Child Report (Child IPI)	57.27	8.18	16	49
Parental Involvement, Parent Report (Parent IPI)	59.70	6.07	21	49
Abstract Reasoning (WCST Categories Completed)	1.47	1.15	0	4
Cognitive Inflexibility (WCST Perseverative Errors)	17.22	10.95	4	46
Sexual Attitudes	0.58	0.56	0	1.88
Pre-coital Behaviors	3.39	2.60	0	9
Externalizing Behaviors	4.56	3.85	0	15

Table 3
Zero-order Correlations between All Study Variables

	1	2	3	4	5	6	7	8	9	10	11
(1) Risky Sexual Attitudes	--	--	--	--	--	--	--	--	--	--	--
(2) Pre-coital Behaviors	0.04	--	--	--	--	--	--	--	--	--	--
(3) Externalizing Behaviors	-0.06	0.23*	--	--	--	--	--	--	--	--	--
(4) Age	-0.37**	0.31**	-0.02	--	--	--	--	--	--	--	--
(5) Gender	-0.22 (p=.059)	-0.39**	0.05	0.06	--	--	--	--	--	--	--
(6) Housing	-0.08	-0.04	0.06	0.05	-0.09	--	--	--	--	--	--
(7) Abstract Reasoning	-0.25*	0.06	0.04	0.04	-0.05	0.05	--	--	--	--	--
(8) Cognitive Inflexibility	0.21 (p=.062)	0.01	0.01	-0.08	0.03	-0.12	-0.48**	--	--	--	--
(9) Parent IBQ	-0.07	-0.08	-0.04	0.07	0.01	0.05	-0.05	-0.05	--	--	--
(10) Child IBQ	-0.21 (p=.069)	-0.24*	-0.35**	-0.21 (p=.074)	0.01	0.03	0.10	0.07	0.10	--	--
(11) Parent IPI	0.08	-0.29**	-0.12	-0.23*	-0.04	0.08	0.01	<0.01	0.37**	0.21 (p=.069)	--
(12) Child IPI	-0.14	-0.07	-0.32**	-0.08	-0.04	0.13	0.06	< 0.01	0.01	0.35**	0.25*

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Bivariate correlations among the proposed independent and dependent variables were also completed and are presented in Table 3. Among dependent variables, as predicted by Problem Behavior Theory, child pre-coital behaviors were positively associated with externalizing behaviors ($r(77)=0.23$, $p=0.04$). Also of note, risky sexual attitudes did not significantly relate to either pre-coital ($r(77)=0.04$, $p=0.71$) or externalizing behaviors ($r(77)= -0.06$, $p=0.59$). Among independent variables, some significant relations appeared. Child and caregiver reports of parental monitoring/involvement were significantly, though not highly, correlated ($r(77)=0.25$, $p=0.03$), whereas child and caregiver reports of parent-child relationship quality were not. A significant, positive association appeared between child reports of relationship quality and parental monitoring/involvement ($r(77)=0.38$, $p<.01$), such that children who perceived better parent-child relationship quality reported more parental monitoring/involvement. Similarly, parent reports of both relationship quality and parental monitoring/involvement were significantly, positively correlated ($r(77)=0.37$, $p<.01$). A significant association between abstract reasoning and cognitive inflexibility also appeared in the expected negative direction ($r(77)=-0.48$, $p<0.01$).

Table 3 also presents the relations between independent and dependent variables. All three dependent measures were significantly correlated with at least one proposed independent variable. Turning to child risky sexual attitudes, there were associations between this outcome variable and abstract reasoning ($r(77)=-0.25$, $p=.03$), cognitive inflexibility ($r(77)=0.21$, $p=.06$), and child report of parent-child relationship quality ($r(77)=-0.21$, $p=.07$) though the latter two relationships only approached significance. Significant negative associations appeared between child pre-coital behaviors and child report of relationship quality ($r(77)=-0.24$, $p=.04$), as well as parent report of parental monitoring/involvement ($r(77)=-0.29$, $p<.01$). Significant relations

were observed between externalizing behaviors and child report of relationship quality ($r(77)=-0.35$, $p<.01$) and child report of parental monitoring/involvement ($r(77)=-0.32$, $p<.01$). All relations were in the expected directions.

3.3 Primary Analyses

Hierarchical multiple regression analyses were completed according to Baron and Kenny's (1986) specifications to examine study hypotheses. Twelve separate analyses were conducted, one for each parenting variable (child and parent reports of relationship quality and parental monitoring/involvement) in combination with both executive functioning variables (abstract reasoning and cognitive inflexibility) with each of the three outcome variables. Because parenting quality was the primary predictor, regressions examined each component of parenting quality variable separately. Since problem solving abilities are comprised of abstract reasoning and cognitive inflexibility processes together, these variables were included together in each regression. When demographic variables and outcome variables were significantly correlated (or approached significance), these variables were controlled in each regression. In these cases, variables were entered in three blocks. The first block included demographic variables as needed; the second block included one parenting variable and both executive functioning variables; and the third block included the interaction term between the parenting variable and each executive functioning variable. Regression analyses with externalizing behaviors as the outcome did not include control variables as a first block, since no demographic variables were associated with child report of externalizing behaviors. Regression analyses are reported in Tables 4-15.

3.3.1 Child sexual attitudes. Results when child sexual attitudes served as the outcome variable are presented in Tables 4 through 7. All the models accounted for a significant amount of variance in child sexual attitudes, ranging from 26% to 33% but only main effects were observed. Age explained a significant portion of variance in all models. A significant positive effect was observed for child report of relationship quality on sexual attitudes, children reporting better relationship quality also endorsed less risky sexual attitudes. No main effects of child report of parental monitoring/involvement, parent report of parenting variables, or executive functioning on risky sexual attitudes were observed. None of the interaction terms between parenting and executive functioning accounted for a significant portion of the variance in child sexual attitudes.

Regression Tables 4-7 for Child Risky Sexual Attitudes Outcome, Controlling for Child Age and Gender

Table 4.
Regression Analyses Examining Effects of Child Reported Parent-child Relationship Quality (IBQ) and Executive Functioning on Child Risky Sexual Attitudes

Predictors	B	SE	CI	β	p
Child Age	-0.15	0.04	-0.23, -0.07	-0.38	<0.01
Child Gender	-0.22	0.11	-0.44, <0.01	-0.20	0.05
Child IBQ	-0.86	0.34	-1.54, -0.18	-0.28	0.02
Abstract Reasoning	-0.07	0.06	-0.18, 0.05	-0.14	0.26
Cognitive Inflexibility	0.07	0.06	-0.04, 0.18	0.14	0.23
Interaction term: Child IBQ x Abstract Reasoning	0.22	0.27	-0.31, 0.76	0.09	0.40
Interaction term: Child IBQ x Cognitive Inflexibility	-0.21	0.30	-0.81, 0.39	-0.08	0.49

Note. Total Model $R^2 = 0.33$, $p < .001$, $\Delta R^2 = 0.01$, $p = 0.48$

Table 5
Regression Analyses Examining Effects of Parent Reported Parent-child Relationship Quality (IBQ) and Executive Functioning on Child Risky Sexual Attitudes

Predictors	B	SE	CI	β	p
Child Age	-0.14	0.04	-0.22, -0.05	-0.35	0.00
Child Gender	-0.22	0.12	-0.45, 0.01	-0.20	0.07
Parent IBQ	-0.11	0.29	-0.69, 0.47	-0.04	0.71
Abstract Reasoning	-0.09	0.06	-0.20, 0.03	-0.19	0.13
Cognitive Inflexibility	0.06	0.06	-0.06, 0.17	0.12	0.33
Interaction term: Parent IBQ x Abstract Reasoning	-0.31	0.39	-1.08, 0.46	-0.11	0.42
Interaction term: Parent IBQ x Cognitive Inflexibility	-0.37	0.32	-1.00, 0.27	-0.15	0.25

Note. Total Model $R^2 = 0.26$, p = .003, $\Delta R^2 = 0.02$, p = 0.51

Table 6
Regression Analyses Examining Effects of Child Reported Parental Monitoring/involvement (IPI) and Executive Functioning on Child Risky Sexual Attitudes

Predictors	B	SE	CI	β	p
Child Age	-0.14	0.04	-0.22, -0.06	-0.35	< 0.01
Child Gender	-0.23	0.12	-0.46,< 0.01	-0.21	0.05
Child IPI	-0.01	0.01	-0.02, 0.01	-0.13	0.24
Abstract Reasoning	-0.08	0.06	-0.19, 0.04	-0.16	0.19
Cognitive Inflexibility	0.07	0.06	-0.05, 0.18	0.14	0.25
Interaction term: Child IPI x Abstract Reasoning	0.01	0.01	-0.01, 0.03	0.11	0.36
Interaction term: Child IPI x Cognitive Inflexibility	0.01	0.01	-0.01, 0.02	0.09	0.47

Note. Total Model $R^2 = 0.28$, p = .002, $\Delta R^2 = 0.01$, p = 0.62

Table 7
Regression Analyses Examining Effects of Parent Reported Parental Monitoring/involvement (IPI) and Executive Functioning on Child Risky Sexual Attitudes

Predictors	B	SE	CI	β	p
Child Age	-0.13	0.04	-0.21, -0.04	-0.32	0.01
Child Gender	-0.24	0.12	-0.48, -0.10	-0.22	0.04
Parent IPI	<0.01	0.01	-0.02, 0.02	0.02	0.87
Abstract Reasoning	-0.10	0.06	-0.21, 0.02	-0.20	0.09
Cognitive Inflexibility	0.06	0.06	-0.06, 0.17	0.12	0.32
Interaction term: Parent IPI x Abstract Reasoning	0.01	0.01	-0.01, 0.04	0.15	0.23
Interaction term: Parent IPI x Cognitive Inflexibility	<0.01	0.01	-0.02, 0.03	0.03	0.81

Note. Total Model $R^2 = 0.26$, p = .003, $\Delta R^2 = 0.02$, p = 0.45

3.3.2 Child pre-coital behaviors. Results are reported in Tables 8 through 11. All the models accounted for a significant amount of variance in child pre-coital behaviors, ranging from 28% to 33%. Age and gender explained a significant portion of variance in all models, such that older children and males reported more pre-coital behaviors. Parent report of parental monitoring/involvement exerted a significant negative effect on child pre-coital behaviors, such that as parent report of monitoring/involvement increased, youth reported fewer child pre-coital behaviors. In contrast to the bivariate correlations discussed above, the relation between child report of the parent-child relationship quality and this outcome variable was not significant once child age and gender were considered. Moreover, neither executive functioning variable exerted a significant effect on child pre-coital behaviors. None of the interaction terms between parenting and executive functioning accounted for a significant portion of the variance in child pre-coital behavior.

Regression Tables 8-11 for Child Pre-coital Behaviors Outcome, Controlling for Child Age and Gender

Table 8
Regression Analyses Examining Effects of Child Reported Parent-child Relationship Quality (IBQ) and Executive Functioning on Child Pre-coital Behaviors

Predictors	B	SE	CI	β	p
Child Age	0.60	0.19	0.23, 0.97	0.33	<0.01
Child Gender	-2.01	0.51	-3.04, -0.99	-0.39	<0.001
Child IBQ	-2.19	1.59	-5.36, 0.98	-0.15	0.17
Abstract Reasoning	0.32	0.27	-0.21, 0.85	0.14	0.23
Cognitive Inflexibility	0.32	0.26	-0.19, 0.83	0.15	0.22
Interaction term: Child IBQ x Abstract Reasoning	2.22	1.24	-0.25, 4.69	0.19	0.08
Interaction term: Child IBQ x Cognitive Inflexibility	-0.56	1.40	-3.36, 2.25	-0.04	0.69

Note. Total Model $R^2 = 0.33$, $p < .001$, $\Delta R^2 = 0.04$, $p = 0.16$

Table 9
Regression Analyses Examining Effects of Parent Reported Parent-child Relationship Quality (IBQ) and Executive Functioning on Child Pre-coital Behaviors

Predictors	B	SE	CI	β	p
Child Age	0.67	0.19	0.30, 1.05	0.37	<0.01
Child Gender	-2.04	0.52	-3.08, -1.00	-0.40	<0.01
Parent IBQ	-1.08	1.31	-3.69, 1.53	-0.08	0.41
Abstract Reasoning	0.20	0.26	-0.32, 0.72	0.09	0.45
Cognitive Inflexibility	0.18	0.25	-0.33, 0.69	0.08	0.48
Interaction term: Parent IBQ x Abstract Reasoning	0.51	1.74	-2.97, 3.99	0.04	0.77
Interaction term: Parent IBQ x Cognitive Inflexibility	-1.98	1.43	-4.82, 0.87	-0.18	0.17

Note. Total Model $R^2 = 0.31$, $p < .001$, $\Delta R^2 = 0.04$, $p = 0.16$

Table 10
Regression Analyses Examining Effects of Child Reported Parental Monitoring/involvement (IPI) and Executive Functioning on Child Pre-coital Behaviors

Predictors	B	SE	CI	β	p
Child Age	0.63	0.19	0.25, 1.00	0.35	<.01
Child Gender	-2.16	0.54	-3.23, -1.09	-0.42	<.01
Child IPI	-0.01	0.04	-0.08, 0.06	-0.03	0.80
Abstract Reasoning	0.15	0.27	-0.38, 0.69	0.07	0.57
Cognitive Inflexibility	0.21	0.26	-0.31, 0.74	0.10	0.42
Interaction term: Child IPI x Abstract Reasoning	0.02	0.04	-0.06, 0.10	0.07	0.56
Interaction term: Child IPI x Cognitive Inflexibility	-0.02	0.03	-0.09, 0.04	-0.09	0.50

Note. Total Model $R^2 = 0.28$, $p = .001$, $\Delta R^2 = 0.02$, $p = 0.43$

Table 11
Regression Analyses Examining Effects of Parent Reported Parental Monitoring/involvement (IPI) and Executive Functioning on Child Pre-coital Behaviors

Predictors	B	SE	CI	β	p
Child Age	0.49	0.19	0.11, 0.87	0.27	0.01
Child Gender	-2.06	0.52	-3.10, -1.02	-0.40	<0.01
Parental IPI	-0.11	0.05	-0.20, -0.02	-0.26	0.02
Abstract Reasoning	0.18	0.26	-0.33, 0.69	0.08	0.48
Cognitive Inflexibility	0.24	0.25	-0.26, 0.73	0.11	0.35
Interaction term: Parent IPI x Abstract Reasoning	0.01	0.05	-0.10, 0.11	0.01	0.91
Interaction term: Parent IPI x Cognitive Inflexibility	0.03	0.05	-0.07, 0.13	0.07	0.59

Note. Total Model $R^2 = 0.33$, $p < .001$, $\Delta R^2 = <0.01$, $p = 0.85$

3.3.3 Child externalizing behaviors. Results are reported in Tables 12 through 15. Two of the four models accounted for a significant amount of variance in child externalizing behaviors, ranging from 14% to 18%. A significant negative effect was observed for child report of relationship quality, with better relationship quality and reduced child-reported externalizing behaviors. Similarly, child report of parental monitoring/involvement exerted a significant negative effect on child externalizing behavior, indicating that children who reported more parental monitoring/involvement reported fewer externalizing behaviors. Neither executive functioning variable exerted a significant effect on child externalizing behaviors.

The effect of child reported parental monitoring/involvement on child externalizing behavior was qualified by a significant interaction between child report of monitoring/involvement and cognitive inflexibility (see Table 14). As predicted, simple slopes probing indicated that at higher levels of cognitive inflexibility, lower child reported parental monitoring/involvement was associated with greater reports of child externalizing behavior, $\beta = -0.57$, $p < 0.01$. In contrast, at low levels of cognitive inflexibility, child report of monitoring/involvement was not associated with child externalizing behaviors, $\beta = -0.03$, $p = 0.84$ (see Figure 1), suggesting that cognitive inflexibility may moderate the impact of child reported parental monitoring/involvement on externalizing behaviors, but only when children experience higher levels of inflexibility.

Regression Tables 12-15 for Child Externalizing Behavior Outcomes

Table 12
Regression Analyses Examining Effects of Child Reported Parent-child Relationship Quality (IBQ) and Executive Functioning on Child Externalizing Behaviors

Predictors	B	SE	CI	β	p
Child IBQ	-7.74	2.52	-12.76, -2.71	-0.37	<0.01
Abstract Reasoning	0.46	0.44	-0.41, 1.33	0.14	0.30
Cognitive Inflexibility	0.34	0.41	-0.49, 1.17	0.11	0.41
Interaction term: Child IBQ x Abstract Reasoning	1.41	2.03	-2.64, 5.46	0.08	0.50
Interaction term: Child IBQ x Cognitive Inflexibility	-0.98	2.16	-5.29, 3.33	-0.05	0.65

Note. Total Model $R^2 = 0.14$, $p = 0.04$, $\Delta R^2 = 0.01$, $p = 0.66$

Table 13
Regression Analyses Examining Effects of Parent Reported Parent-child Relationship Quality (IBQ) and Executive Functioning on Child Externalizing Behaviors

Predictors	B	SE	CI	β	p
Parent IBQ	-0.51	2.21	-4.91, 3.90	-0.03	0.82
Abstract Reasoning	0.31	0.44	-0.57, 1.19	0.09	0.48
Cognitive Inflexibility	0.17	0.42	-0.67, 1.01	0.05	0.69
Interaction term: Parent IBQ x Abstract Reasoning	-2.83	2.88	-8.57, 2.91	-0.14	0.33
Interaction term: Parent IBQ x Cognitive Inflexibility	-5.47	2.40	-10.26, -0.68	-0.33	0.03**

Note. Total Model $R^2 = 0.07$, $p = 0.35$, $\Delta R^2 = 0.07$, $p = 0.07$
**Although this interaction is significant, these results are questionable because the overall model did not explain a significant amount of variance in externalizing behaviors.

Table 14
Regression Analyses Examining Effects of Child Reported Parental Monitoring/involvement (IPI) and Executive Functioning on Child Externalizing Behaviors

Predictors	B	SE	CI	β	p
Child IPI	-0.15	0.05	-0.26, -0.04	-0.32	0.01
Abstract Reasoning	0.16	0.42	-0.68, 0.99	0.05	0.71
Cognitive Inflexibility	0.06	0.40	-0.74, 0.86	0.02	0.88
Interaction term: Child IPI x Abstract Reasoning	<-0.01	0.06	-0.13, 0.12	-0.01	0.97
Interaction term: Child IPI x Cognitive Inflexibility	-0.11	0.05	-0.21, -0.01	-0.28	0.03

Note. Total Model $R^2 = 0.18$, $p = 0.01$, $\Delta R^2 = 0.08$, $p = 0.04$

Table 15
Regression Analyses Examining Effects of Parent Reported Parental Monitoring/involvement (IPI) and Executive Functioning on Child Externalizing Behaviors

Predictors	B	SE	CI	β	P
Parent IPI	-0.09	0.08	-0.24, 0.07	-0.14	0.26
Abstract Reasoning	0.22	0.45	-0.67, 1.12	0.07	0.62
Cognitive Inflexibility	0.15	0.43	-0.72, 1.01	0.05	0.74
Interaction term: Parent IPI x Abstract Reasoning	-0.03	0.09	-0.21, 0.15	-0.04	0.76
Interaction term: Parent IPI x Cognitive Inflexibility	0.02	0.09	-0.15, 0.19	0.03	0.81

Note. Total Model $R^2 = 0.02$, $p = 0.89$, $\Delta R^2 = <0.01$, $p = 0.85$

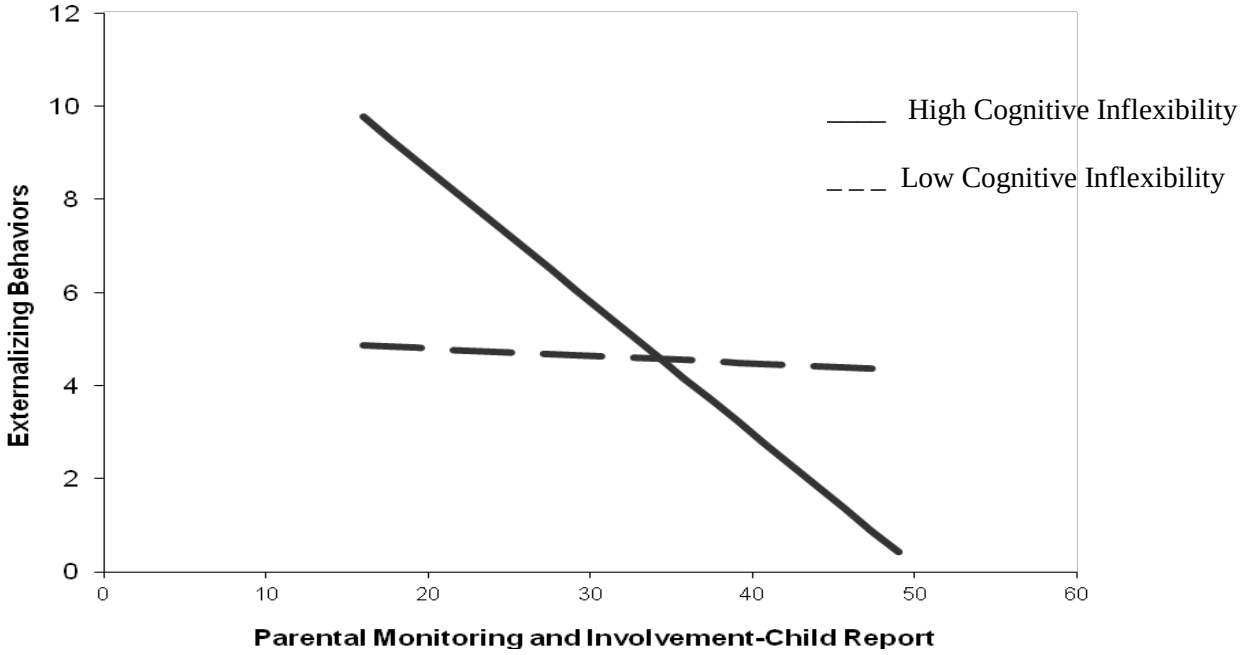

Figure 1.
Simple Slopes Probing the Effect of Child Reported Parental Monitoring on Externalizing Behaviors, Moderated by Cognitive Inflexibility

4 Discussion

The purpose of this study was to examine the impact of parenting and executive functioning on HIV risk among a sample of township-dwelling South African youth. Specifically, the study addressed whether parent-child relationship quality and parental monitoring/involvement were related to risk factors, including sexual attitudes, pre-coital behaviors, and externalizing behaviors, and whether there was any moderating effect of executive functioning. Considerable U.S.-based research has demonstrated a direct link between parenting and youth outcomes. However, we found only one study focused on the role of parenting for South African youth. Moreover, few studies with U.S. samples have examined the role of neuropsychological functioning in the relations between parenting and child outcomes, and none have occurred in a South African context. The goal of this research was to improve understanding of factors associated with HIV risk in South African youth, a group very vulnerable to infection. The potential protective roles of parenting and executive functioning may aid in the development of HIV preventions tailored to these youth.

4.1 Descriptive Summary

Participants for this study were drawn from a sample of 99 South African parent-child dyads engaged in a parent study aimed at developing and evaluating a family-based HIV prevention intervention. A final sample of 77 parent-child dyads completed all the measures and was included in the study. A significant majority of the families were primarily Xhosa-speaking, which is consistent with the demographic composition of Langa township and Cape Town more broadly (Statistics South Africa, 2001). Female caregivers were, on average, middle-aged, and the majority of families lived in stable housing. Among youth participants, approximately half were males and had not yet reached teenage years. Overall, the youth and parents in this study

reported positive parent-child relationships. Levels of parental monitoring/involvement fell in the mid-range of the measure, based on child and parent report. With respect to parenting variables, parent and child reports were not consistently related. Parent and child reports of monitoring/involvement did correlate significantly. However, parent and child reports of relationship quality were not related, which is in contrast to previous research (Palin et al., 2009). This lack of a correlation should be further studied, but also reveals the potential for common method variance issues in this sample. Parents or children may be providing responses based on contexts unrelated to the construct measure, such as social desirability. Also, the IPI examined the frequency of actual involvement/monitoring behaviors, whereas the IBQ measured perceptions of relationship quality. Frequencies of actual behaviors, as in the IPI, may be more objectively observed and lead to agreement between parent and child reports. However, perceptions of relationship quality include more subjective accounts of interactions, which could lead to differing experiences of relationship quality for the caregiver and child. Finally, children tended to report protective sexual attitudes and few pre-coital and externalizing behaviors. At this point in their development, children may have yet to experiment in risky behaviors, indicating an optimal time for preventive interventions. Alternatively, this generation of young adolescents may have already benefited from increased HIV prevention efforts in the media, schools, and communities.

Among demographic variables, only age and gender were significantly related with predictor and outcome variables. Older children possessed less risky sexual attitudes, but also engaged in more pre-coital behaviors. It is possible that as children age, increased knowledge about safer sexual practices influenced their belief systems. However, as older children mature, one expects that they begin to explore and engage in pre-coital behavior. Males reported both

riskier sexual attitudes and more pre-coital behavior, which is consistent with previous research in South Africa (Brook, Morojele, Zhang, & Brook, 2006). Previous studies also suggested that in South Africa, particularly Xhosa culture, females bear more of the responsibility with respect to protective sexual attitudes and behaviors due to the male-dominant gender role norms (Salo, 2006; Simbayi et al., 2005). Particularly in the Xhosa-speaking culture, males have been socialized to maximize their sexual experiences with "loose" women and simultaneously hold a relationship with a steady partner, who is more conservative and appropriate for a child-bearing role (Salo, 2006). Males used condoms more with women who were presumed to have multiple partners, but avoided condom use with their steady partners under the presumption that steady partners would be loyal and not "wander with other men" (Salo, 2006; Simbayi et al., 2005). The latter findings, in conjunction with others (e.g., Pettifor, Measham, Rees, & Padian, 2004) and those of the current study, provide evidence that males may be a particular important target for HIV prevention interventions.

4.2 Primary Findings

Turning to the study hypotheses, though results were limited to a few relations, all were as anticipated. Regarding the first hypothesis, that the parent-child relationship and parental involvement/monitoring would be associated with HIV risk indicators, direct relations were observed. In this study of South African youth, we found direct associations between parenting and youth risk, which is consistent with previous U.S. data and the available South African research on the influence of family on youth outcomes (Day & Padilla-Walker, 2009; Harnish et al., 1995, Kanti et al., 2008; Kotchick et al., 2001; Li, Fiegelman, & Stanton, 2000; Palin et al., 2009; Prado et al., 2007; Tinsley et al., 2004; Tubre, 2008). Consistent with study hypotheses, child attitudes about sex were associated with the child's report of parent-child relationship

quality. Children who perceived a poorer relationship with their primary female caregiver reported attitudes that place them at risk for HIV. These attitudes regarded beliefs about onset of sexual activity, condom use, sex with older adults, and the exchange of gifts for sex. Improving relationship quality between caregiver and child, which may result in greater comfort in addressing sexual topics, may curb riskier sexual attitudes among children. Also, by improving relations between parents and children, children may be more likely to adopt positive values modeled by their parents and be more willing to take helpful instruction. In contrast, parent-child relationship quality based on either reporter was not associated with youth reports of pre-coital behavior. Rather, the parent's report of the extent to which they monitor and stay involved with their child's activities was associated with behaviors that may lead to sexual risk. Children who spend more time in the company of their primary caregiver and whose caregivers are aware of their activities when they are not together, likely have less opportunity to engage in sexual situations (e.g., kissing, fondling) than those whose parents are less vigilant. The final direct association was observed between the child report of relationship quality and their endorsement of externalizing problems, providing further evidence of the importance of the child's perception of his/her relationship with the primary caregiver. In this relation, child perception of better parent-child relationship quality was related to fewer deviant and aggressive behaviors. However, this association may also be interpreted as a poor relationship between parent and child that is potentially driven by the stress of multiple child problem behaviors. Though concerns of common reporter method variance cannot be overlooked, these data illuminate a potential point of intervention with respect to two aspects of youth risk: attitudes and externalizing behaviors.

Child report of the parent-child relationship related directly to more outcomes (i.e., externalizing behaviors, pre-coital) than parent report of this variable. This suggests that in this sample, child perception of how well they and their parent communicate and otherwise interact with one another is particularly important. Related, parent and child reports of relationship quality were not correlated with one another. Given these findings, research focused on relationship quality will benefit from obtaining multiple perspectives of this parent-child relationship.

Parent reports of monitoring/involvement correlated with only one outcome, pre-coital behaviors, while parent report of relationship did not significantly relate to any of the outcomes. Monitoring/involvement behaviors may be protective against these behaviors due to the physical hindrance of these activities. If parents are physically more present in the activities of their younger children, this presence may prevent the occurrence of pre-coital behaviors that otherwise may take place. In addition, the more time parents spend with their children, the more opportunities parents will have to model positive behaviors through engagement and interactions. These results are consistent with previous findings (Luster & Small, 1994).

In this study, the evidence suggests that positive parenting may be a critical protective factor against youth HIV risk behaviors. Those children that experience positive relationships with parents and perceive greater parental involvement may develop protective belief systems and accompanying behaviors that reduce vulnerability to risky behaviors. Given the high demand for effective HIV prevention strategies in South Africa, family-based interventions that include an emphasis on parenting may be a valid option to consider in prevention reforms. The potential impact of parenting on youth behaviors offers an additional avenue of prevention, which may be more effective if implemented when children are younger and have limited

experience with riskier sexual behavior. However, it is also important to note that these data are correlational in nature and preclude assumptions of causation.

Finally, a combined effect of child report of parental monitoring/involvement and child cognitive inflexibility was observed to associate with youth aggressive and delinquent behaviors. This observation supported the second hypothesis of an interactive effect of parenting and child executive functioning to predict risk behavior. Children with higher inflexibility and reduced parental involvement reported more defiant and aggressive behaviors. However, those children who had the most difficulty with flexibility also benefited most from having more present and involved parents, as demonstrated by lower reports of externalizing behaviors. Also, parents who are aware of their child's limitations in problem solving abilities and flexibility may adjust their parenting and choose to be more involved, which reduces the presence of risk behaviors. However, in children with low inflexibility, a relationship between parental monitoring/involvement and problem behaviors was not observed. Children with low inflexibility reported consistently low levels of externalizing behaviors, regardless of parental monitoring/involvement, which may explain the lack of an observed interaction with executive functioning. Overall, those children who had the most difficulty in generating problem solving strategies benefit most when parents show a greater engagement and involvement in their lives. Without this interaction, the model explains approximately 10% of the variance in externalizing behaviors. When including the interaction, the model explains an additional 8%, which highlights the significant impact of the combined effect of parenting and neuropsychological variables in this particular outcome.

Executive functioning's indirect role in predicting risk behavior in this sample is consistent with previous research (Gonzalez et al., 2005; Romer et al., 2009). Additionally, these

observations further support prior studies which incorporated parenting and neurocognitive factors simultaneously to predict child behavior (Arseneault, Tremblay, Boulerice, & Saucier, 2000; Mofitt & Caspi, 2001; Raine et al., 1996). Arseneault and colleagues (2000) Moffit & Caspi (2001), and Raine and colleagues (1996) offered evidence for this interaction in infants and young children. The present study is the first documentation of these observations in an adolescent sample. However, it is important to note that the cross-sectional nature of these data precludes assuming that reports of lower parental monitoring/involvement combined with poorer executive functioning caused an increase in externalizing behaviors. Regardless, these relations illuminate the need to identify those children who may benefit from the combination of improved parenting and remediation of neurocognitive deficits. Children who report more risk behaviors may be identified as those with parents who are infrequently involved in daily activities or unaware of their child's whereabouts; however, it is important to note, in the current sample, this effect was only present among children who were also unable to successfully generate multiple solutions to challenging situations. A family-based HIV-prevention intervention that addresses positive parenting strategies and teaches children the skills to improve the generation of solutions to potential risks, such as condom use negotiation and multiple partners, may be most effective in this population.

The majority of the models predicting sexual attitudes, pre-coital behaviors, and externalizing problems significantly explained variance in these outcomes. However, the number of significant effects was relatively small. One explanation for this observation may be the inclusion of child gender and age as control variables in the models that included sexual attitudes and pre-coital behaviors. These demographic variables were strongly correlated with risky sexual attitudes and pre-coital behaviors and accounted for more variance than parenting

and executive functioning. A larger sample size that allows for the examination of effects within gender and age groups may provide additional important information, particularly with respect to the potential interactions between parenting variables and executive functioning.

Previous research has not examined the relations between executive functioning processes and sexual attitudes. This study offers evidence for these relations. Executive functioning correlated significantly and marginally with sexual attitudes, such that better reasoning was associated with less risky sexual attitudes. In this sample, those children who were able to think more abstractly and less concretely were also less likely to have riskier attitudes about sex. This relationship may also indicate that when these children are in difficult situations, they will be able to formulate effective strategies to address these challenges. Cognitive inflexibility was marginally related to risky sexual attitudes, suggesting that those children who experience difficulty thinking broadly and generating multiple solutions to a problem may also have riskier beliefs about sexual behavior. These relationships are the first known attempts to examine the possible link between executive functioning and HIV risk outcomes in South Africa.

The results in this study were consistent with previous research that failed to observe direct relations between executive functioning and delinquent and aggressive behaviors (Fairchild et al., 2009; Romer et al., 2009). Previous research that demonstrated this direct link used more broad definitions of executive functioning (Nigg et al., 2004), which employed factor analyzed composite scores of several measures in their operationalized definitions (Giancola, Shoal, & Mezzich, 2001). In this study, only measures of abstract reasoning and cognitive inflexibility in the WCST were implemented. Potentially, the use of only one measure of executive functioning may not be comprehensive enough to observe relations between executive

functioning and risk behaviors. Alternatively, as Gonzalez and colleagues (2005) suggested, executive functioning in combination with other non-neurocognitive factors may best predict risk behaviors.

4.3 Limitations

This study had several limitations. As previously mentioned the data were cross-sectional and the sample size limited. Additionally, many of the measures implemented in this study were used with this sample without confirming reliability and validity. The measures in this study used gated questions, particularly for items regarding sexual behavior. Child participants were not asked all the items in the measures, and therefore the full breadth of these children's sexual experiences was unknown. Also, although the WCST has previously been administered with South African youth, this measurement for executive functioning has been criticized for a lack of cultural congruency beyond the standardization populations (Skuy et al., 2001) and for lack of ecological validity (Burgess et al., 1998). Because the parent study primarily focused on psychosocial and behavioral components of HIV risk, evaluation of neurocognitive contributions was limited to one measure, the WCST (Heaton et al., 1993), a tool that is notable for its ease of administration and previous use in multiple international settings (Skuy et al., 2001). An expanded assessment of executive functioning, which includes factors such as impulsivity and inhibition to provide a broader conceptualization and operationalization, may offer a clearer picture of the role of executive functioning in risk behavior outcomes. Finally, these results may not be generalizable to all South African youth. The particular parent-child dynamics and risk factors which were examined in this study are specific to a mostly Xhosa-speaking, black South African sample. These concepts and relationships may appear differently in the cultural contexts of other South African children, but may benefit from similar study.

Future studies of HIV risk in South African early adolescents may benefit from examining other constructs that may impact HIV risk. Gender role beliefs may affect the degree and breadth of interactions between caregivers and children, which in turn may impact child behaviors (Salo, 2006; Simbayi et al., 2005). Examining the role of gender beliefs offers a more culturally relevant representation of the dynamics between caregivers and children, in addition to how these interactions contribute to child behavior outcomes. This may also include comparing caregiver-child relationships and parenting quality across child gender.

Despite the study's limitations, it offers useful information for those working in HIV prevention among South African youth. Little research has examined the contributions of parenting to risk behavior outcomes, and this is the first study to examine the role of neurocognitive functioning in South African youth risk. The combined effect of these variables in predicting risk outcomes offers unique information for HIV prevention strategies in this population of South African youth. The identification of those youth who experience poor parenting and exhibit greater neurocognitive impairment may be important for distinguishing those individuals who may be more likely to report behaviors associated with HIV risk.

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