THE INFLUENCE OF ADOLESCENT FRIENDSHIPS ON STI/HIV RISK BEHAVIORS
IN EMERGING ADULTHOOD

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ABSTRACT

TILDA FARHAT: The Influence of Adolescent Friendships on STI/HIV Risk Behaviors in
Emerging Adulthood.
(Under the direction of Carolyn Halpern)

BACKGROUND: The transition from adolescence to adulthood, referred to as emerging
adulthood, is accompanied by an increase in risky sexual activity and injection drug use, two
behaviors that are the main routes of transmission of sexually transmitted infections and HIV
(STI/HIV). Given that adolescents and emerging adults are disproportionately affected by STI/HIV,
understanding adolescent predictors of risk behaviors for STI/HIV in emerging adulthood is
important to mitigate STI/HIV risk among youth. Three dimensions of friendships (friendship
quantity, quality and the friends' risk behaviors) are particularly useful in predicting adolescents' and
young adults' STI/HIV risk behaviors. These friendship dimensions have often been considered
separately. But recent research suggests that they interact. This study therefore combined
developmental and public health perspectives to examine whether dimensions of adolescent
friendships interact to influence emerging adults' STI/HIV risk behaviors. Gender and racial
differences were investigated.

METHODS: Analyses were based on 1,154 respondents, aged 12-18 years at baseline, who
participated in Waves I and III of the National Longitudinal Study of Adolescent Health. The
STI/HIV risk behaviors scale was created as a composite measure of the sexual activities and drug
use behaviors that directly influence STI/HIV transmission. Independent variables included: number
of friends (friendship quantity), emotional and behavioral closeness to friends (friendship quality),
and friends' STI/HIV risk behaviors. Multiple linear regression models were used to examine the
study's aims.

RESULTS: In emerging adulthood, the mean number of STI/HIV risk behaviors respondents had engaged in was 3.26 (range: 0-7). No interaction effects were observed between friends' STI/HIV risk behaviors and: number of friends, emotional and behavioral closeness to friends. There was a weak positive relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood, and a direct effect of behavioral closeness to friends on STI/HIV risk behaviors in emerging adulthood. Most associations did not vary by gender or race.

CONCLUSION: Closer friendships in adolescence predicted more STI/HIV risk behaviors in emerging adulthood, regardless of the friends' STI/HIV risk behaviors. Findings are discussed in light of developmental and public health perspectives on the importance of friendships in adolescence.

To my parents, Mounir and Christiane, for always being there for me, no matter how far away I am.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. Introduction

I.1. Problem Statement

The transition from adolescence to adulthood, referred to as *emerging adulthood*, is characterized by profound changes in personal and social roles, and is increasingly recognized as a distinct period of the life course. It is often accompanied by an increase in risk behaviors, including risky sexual activity and injection drug use (Arnett, 2000, 2005; Lerner & Galambos, 1998; Schulenberg et al., 2005), two behaviors that are the main routes of transmission of sexually transmitted infections and HIV (STI/HIV) (The National Center on Addiction and Substance Abuse at Columbia University, 1999). Given that adolescents and emerging adults are disproportionately affected by STI/HIV (Chesson et al., 2004; Weinstock et al., 2004), understanding adolescent predictors of risk behaviors for STI/HIV in emerging adulthood is important to design appropriate interventions to mitigate STI/HIV risk among youth (Bates & Labouvie, 1997; Steinberg & Lerner, 2004; Steinberg & Morris, 2001).

One important predictor of STI/HIV risk behaviors is adolescents' social context, and specifically their friendships (Oetting & Donnermeyer, 1998). In Western societies, having friends and forming close friendships are considered to be critical components of healthy adaptation in adolescence (Capaldi et al., 2001; Goldstein et al., 2005; Hartup, 1989, 1996; Maggs & Hurrelmann, 1998; Petersen, 1988; Roisman et al., 2004; Waters & Sroufe, 1983). Friendships made in adolescence have been posited as conferring benefits that may extend beyond the adolescent years (Giordano et al., 1998; Parker & Asher, 1987).

Three dimensions of friendships, namely friendship quantity, quality and the friends' risk behaviors, are particularly useful in predicting adolescents' and young adults' outcomes (Hartup &

Stevens, 1997). However, most of the research conducted to date on the long-term effects of adolescent friendships, and specifically on the relationship between adolescent friendships and young adults' STI/HIV risk behaviors has not simultaneously considered these three dimensions of friendships (Feldman et al., 1995; Hartup, 1995; West et al., 1999; Zimmer-Gembeck et al., 2004). Recent research suggests that friendship dimensions interact and therefore considering each dimension as an independent predictor of adolescent and young adult outcomes might generate misleading conclusions regarding the contribution of adolescent friendships to emerging adults' STI/HIV risk behaviors (Berndt, 2004; Giordano, 2003; Hartup, 1996). From a developmental standpoint, having friends and forming close friendships in adolescence have been considered as essential developmental tasks of this life stage and have been hypothesized to predict positive behavioral, social and health outcomes in adulthood, regardless of who the friends are. However, forming friendships, especially high-quality ones, with individuals with risky behaviors might be counter-productive and ultimately have a negative impact on emerging adults' STI/HIV risk behaviors.

I.2. Study Aims and Overview

The overall purpose of this study is to examine whether dimensions of adolescent friendships interact to influence emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline adolescent STI/HIV risk behaviors. The STI/HIV risk behaviors variable is a composite measure of the sexual activities and drug use behaviors that directly influence STI/HIV transmission. The five key risk behaviors combined to form the STI/HIV risk behaviors variable are: being sexually active, number of sexual partners, condom use, the exchange of sex for drugs or money, injection drug use, and men having sex with men (MSM).

Three types of friendship dimensions will be examined, each of which has been independently associated with adolescent substance use and sexual activity. The dimensions are

friendship quantity (the number of friends the adolescent has), friendship quality (adolescents'

closeness to friends) and the friends' STI/HIV risk behaviors.

The three aims of the study are:

1) To examine the relationship between STI/HIV risk behaviors in adolescence and in

emerging adulthood, and investigate gender and racial differences in this relationship;

2) To examine the association between adolescents' STI/HIV risk behaviors and three

friendship dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk

behaviors; and to determine whether the association varies by gender and race; and

3) To examine the effects of interactions among friendship dimensions in adolescence on

emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk

behaviors; and investigate gender and racial differences in these associations.

Gender and racial differences will be examined for all three aims because research on

adolescent friendships has generally considered White middle-class samples (Lerner et al., 2001).

However, the few studies that have examined friendships of minority adolescents suggest that there

are significant racial differences in the quality and characteristics of their friendships (Way & Chen,

2000; Way et al., 2001). In contrast, gender differences in adolescent friendships have been

investigated more frequently, with most research converging on the conclusion that friendships

among boys and girls are different (Crosnoe, 2000; Giordano et al., 1998; Parker & Asher, 1993; Roy

et al., 2000). Given that STI/HIV risk behaviors in emerging adulthood differ by gender and race, the

relationship between the three dimensions of friendships in adolescence and emerging adults'

STI/HIV risk behaviors might also vary by gender and race.

This study is guided by three theories: two theoretical perspectives from the developmental

literature (Sroufe's (1997) organizational-developmental theory and Collins' (1997) developmental

perspective on relationships) and Oetting and Donnermeyer's (1998) Primary Socialization theory.

Data for this research come from Waves I and III of the *National Longitudinal Study of Adolescent Health*, a school-based, nationally representative, longitudinal study of the health-related behaviors of adolescents and their outcomes in young adulthood (Harris et al., 2003).

I.3. Significance

The proposed study could make meaningful contributions to previous research on the influence of adolescent friendships on STI/HVI risk behaviors in emerging adulthood. First, this will be one of the few studies to assess the long-term influences of adolescent risk factors, friendships in this case, on risk behaviors in emerging adulthood. The information will prove useful to test the enduring effect of adolescent risk factors, i.e., do factors associated with increased risk behavior in adolescence also predict sustained involvement in risk during the transition to emerging adulthood? An essential goal for research on adolescence is to determine to what extent this developmental period affects subsequent stages in life (Caspi et al., 1998; Elder, 1998; Macmillan & Hagan, 2004; Pulkkinen & Caspi, 2002). Evidence that risk or protective factors in adolescence do have long-term effects could ultimately justify more funding and attention dedicated to the research and promotion of adolescent health.

Second, this study will assess the usefulness of examining friends' risk behavior in conjunction with friendship quality and quantity for predicting adolescent risk behavior. Studies have often examined these constructs in isolation from one another, providing an incomplete assessment of the role of friendships in adolescent development. Hartup (1996) states that "one cannot describe friendships and their developmental significance without distinguishing between having friends, the identity of the child's friends, and friendship quality" (p.2).

Third, this study, by recognizing the need to appropriately integrate the different dimenions of adolescent friendships, provides an empirical application of primary socialization theory (Oetting & Donnermeyer, 1998). This theory posits that the influence of the primary social context of adolescents, which includes parents, peers, and schools, depends on the quality of the relationship

between the adolescents and their social context. However, studies examining the influence of friends' behavior on adolescents' behavior generally fail to account for the quality of the relationship.

Finally, this study could provide empirical support for the usefulness of jointly considering developmental and public health theories for STI/HIV prevention. The developmental psychology literature has researched extensively the significance of friendship formation and quality while the public health literature has mostly focused on the influence of friends' risk behaviors (Berndt & Murphy, 2002). This dichotomy is a reflection of a more general lack of integration between developmental theory and research and prevention programming (Catalano et al., 2002). The fact is, researchers from different disciplines often focus on different aspects of a problem (Petraitis et al., 1995). However, they are increasingly recognizing the need, and attempting to integrate, developmental theory into public health, epidemiology, social work and sociology to design effective preventive interventions (Catalano et al., 2002).

I.4. Organization of the Dissertation

This dissertation includes six chapters. Chapter Two reviews the relevant theoretical and empirical literature on a) adolescent and emerging adults' STI/HIV risk behaviors; b) adolescent friendship dimensions including friendship quantity, quality and friends' behavioral identity; and c) the relationship between adolescents' STI/HIV risk behaviors and friendship dimensions. Chapter Three describes the study's conceptual model, the variables included in the model, the study purposes, research questions and hypotheses. Chapter Four presents the study methodology, including the study design, sample construction, variable definitions and analysis plan. Chapter Five presents the results of this analysis and Chapter Six includes a discussion of the study findings and their relevance for future research.

II. Literature Review

This review is divided into four sections. The first three sections provide background and significance information for each of the three areas of research addressed by the proposed study, namely: adolescents' and emerging adults' STI/HIV risk behaviors; the different dimensions of adolescent friendships; and the relationship between the friendship dimensions and emerging adults' STI/HIV risk behaviors. Racial and gender disparities relating to these topics will also be explored. A fourth section describes the theoretical and conceptual influences for this study.

II.1. STI/HIV in Adolescence and Emerging Adulthood

This section presents the extent of the STI/HIV problem among young people, describes the contribution of injection drug use and sexual activity to the transmission of infection, presents information on the changes in adolescent risk behaviors including drug use and sexual activity during the transition to emerging adulthood, and finally explores racial and gender differences in STI/HIV and risk behaviors for these infections.

II.1.1. STI/HIV among Adolescents: A Current Public Health Problem

Adolescents and young adults are disproportionately affected by sexually transmitted infections (STI) and HIV (STI/HIV) (Chesson et al., 2004; Weinstock et al., 2004). Of the 18.9 million new cases of STIs, including HIV, that occurred in 2000 in the US, 9.1 million (48%) were among young people aged 15-24 (Weinstock et al., 2004). Although this age group constitutes one-fourth of the population aged 15-44, they acquire about half of all new STIs (Weinstock et al., 2004).

Despite their preventable nature, STI/HIV remain a significant public health problem, with serious health, economic, and social consequences for the adolescents themselves, their families and society in general (U.S. Department of Health and Human Services, November 2000). Health

consequences are often recognized long after infection, due to the absence of symptoms or the long latent period of the infection, thus leading to increased complications (such as reproductive health problems) (Aral, 2001), and the potential to spread the infection (U.S. Department of Health and Human Services, November 2000). Acquiring sexually transmitted infections can also increase the risk of subsequent HIV infection (Chesson & Pinkerton, 2000; Wasserheit, 1992; Weinstock et al., 2004). Economic consequences include the direct costs of treatment, as well as indirect costs associated with productivity losses attributable to STI/HIV-related illnesses (Chesson et al., 2004). Chesson and colleagues (2004) estimated that the total burden of the 9 million new cases of STI/HIV that occurred among 15-24 year olds in 2000 was $6.5 billion. Finally, social costs experienced by adolescents include school drop-out and the stigma that may be associated with STI/HIV (e.g., social exclusion) (Dias et al., 2006).

II.1.2. Risky Sexual Behavior and Injection Drug Use among Adolescents: Their Contribution to STI/HIV

Both risky sexual activity and injection drug use increase the risk of STI/HIV infection (Centers for Disease Control and Prevention, 2005; Santibanez et al., 2006; The National Center on Addiction and Substance Abuse at Columbia University, 1999). Sexual risk behaviors such as having multiple partners and engaging in unprotected intercourse provide a direct route for the transmission of infections. Injection drug use also contributes to an increased risk of transmission of STI/HIV either directly through needle-sharing or indirectly, through engagement in risky sexual behavior (Rosenbaum & Kandel, 1990) such as the exchange of sex for money or drugs, being sexually active with other injection drug users, or the inconsistent use of condoms (Fortenberry, 1998; Kuyper et al., 2005; Santibanez et al., 2006; Tyndall et al., 2002).

Given that both risky sexual activity and injection drug use put individuals at risk of STI/HIV transmission, involvement in both should be considered to determine a person's risk for STI/HIV. This study will do so by creating a composite measure, STI/HIV risk behaviors, that incorporates individuals' engagement in risky sexual activity and injection drug use.

II.1.3. Developmental Perspective on Adolescent Risk Behaviors

Adolescence is a period of experimentation characterized by the initiation of sexual behavior and substance use and greater risk-taking in these behaviors (Maggs & Hurrelmann, 1998). Engagement in risk behaviors in this life stage is viewed as part of normative adolescent development (He et al., 2004; Lerner et al., 2005; Lerner & Castellino, 2002; Maggs & Hurrelmann, 1998) and may help adolescents navigate through this period (Dworkin, 2005; Maggs & Hurrelmann, 1998; Newcomb & Bentler, 1989; Petersen, 1988; Poulin et al., 1999). Therefore, experimentation has been described as "healthy exploration" (Maggs & Hurrelmann, 1998) and could be a means for adolescents to develop responsible decision-making with respect to these behaviors. While experimentation is common among adolescents, there is diversity in the extent to which adolescents engage in risk behaviors, ranging from modest exploration to high-risk activities, with varying consequences on their health and well-being (Steinberg & Morris, 2001). However, most adolescents engage in only moderate risk-taking behaviors and few exhibit excessive risk-taking (He et al., 2004; Steinberg & Morris, 2001).

The transition from adolescence to adulthood is characterized by profound changes in personal roles as young people explore possibilities in love, work and worldviews (Arnett, 2000). During the past decades, this period has lengthened and is therefore increasingly recognized as a distinct period of the life course, being neither adolescence, nor adulthood, and not merely a brief passage between both (Arnett, 2000; Shanahan, 2000). This period has been referred to as *emerging adulthood* and is posited to roughly extend between 18 and 25 years (Arnett, 2000). Emerging adulthood is often accompanied by an increase in risk behaviors, specifically substance use and sexual activity (Arnett, 2000, 2005; Schulenberg et al., 2005). However, emerging adulthood is also defined by diverse paths in risk behaviors (Arnett, 2000) and therefore individual variations in risk behavior change are observed that do not necessarily follow the population trend (Harris et al., 2006; Schulenberg & Maggs, 2002; Schulenberg et al., 2005).

During the transition to emerging adulthood, few adolescents escalate to extremely high levels of risk (Johnston et al., 1997; Steinberg & Morris, 2001). As for individuals who engaged in high-risk activities in adolescence, heightened risk behavior is often limited to this developmental stage and gives way to moderation or cessation as adolescents transition to emerging adulthood (Burt, 2002; He et al., 2004; Maggs & Hurrelmann, 1998; Newcomb & Bentler, 1989; Steinberg & Morris, 2001). However, sustaining high-risk behaviors beyond adolescence might be an indication that adolescents are having difficulties dealing with developmental tasks (Hurrelmann, 1990), and are therefore more vulnerable to future problems (Lerner & Galambos, 1998; Steinberg & Morris, 2001). In addition, the longer adolescents maintain their high-risk patterns, the more difficult it will be to deflect them away from them (Sroufe, 1997; Vaughn, 2005). Researchers have recognized that the development of risk behaviors in adolescence and young adulthood can follow multiple paths (e.g., adolescents may consistently exhibit low-risk behaviors or high-risk ones, or change their level of risk) (Arnett, 2000; Schulenberg et al., 2005; Sroufe, 1997) and that individuals have the ability to change from one pathway to another (Lerner et al., 2005; Sroufe, 1997; Steinberg & Lerner, 2004).

II.1.4. Racial and Gender Differences in STI/HIV risk behaviors

Racial and gender differences in STI/HIV exist among US adolescents. Black adolescents and especially women are disproportionately affected by STI/HIV. As of 2001, 71% of AIDS cases reported among 13-19 year-olds were among Black and Hispanic youth, although Blacks and Hispanics make up only 30% of that age-group (Centers for Disease Control and Prevention, 2004). Surveillance data from 2003 show that the rate of Chlamydia among Black men and women was more than 7 and 11 times higher than the rate among White men and women, respectively (Centers for Disease Control and Prevention, 2004). Similarly, gonorrhea rates for Black women aged 15-24 were 14 times greater and that of Black men aged 15-24 were 39 times greater than the rates for their White counterparts (Centers for Disease Control and Prevention, 2004). Women are especially susceptible to infection, with Black adolescent women displaying the highest rates of STI/HIV (Aral, 2001; Centers for Disease Control and Prevention, 2004; U.S. Department of Health and Human

9

Services, November 2000). Finally, a recent study estimating HIV prevalence rates among a nationally representative sample of young adults in the US (using data from the National Longitudinal Study of Adolescent Health) concluded that non-Hispanic Blacks had the highest rates (4.9 per 1000) compared to other racial groups (0.22 per 1000) (Morris et al., 2006).

Risk behaviors for STI/HIV, namely injection drug use and risky sexual activity, also vary by race and gender (Averett et al., 2004; Halpern et al., 2004; Weden & Zabin, 2005). Racial and ethnic minorities tend to engage in more risky sexual practices than do non-Hispanic whites. Black adolescents in particular are more likely to be sexually active than Whites and become sexually active at earlier ages (Averett et al., 2004; Rosenbaum & Kandel, 1990; Santelli et al., 2000). Finally, a 1998 study of racial disparities in injection drug use in 94 large US metropolitan areas revealed that while Whites constituted the majority of injectors (determined by comparing the racial composition of injection drug users), Blacks were more likely to inject than Whites (determined by comparing the proportion of injectors from each racial group) (Cooper et al., 2005).

Race/ethnic and gender disparities in illegal drug use – including injection drug use – sexual behavior and STI have also been reported during the transition from adolescence to emerging adulthood (Harris et al., 2006). In the first study to examine longitudinal changes in racial and gender disparities in risk behaviors from adolescence to emerging adulthood, Harris and colleagues (2006) found that White males experienced a higher increase in drug use than Blacks (Harris et al., 2006). In contrast, Black females experienced a higher increase in the number of STI diagnoses as compared to White females (Harris et al., 2006). Unfortunately, no information was available on specific measures of sexual behavior.

Based on the above review, the first aim of this study is as follows:

> **<u>Study Aim I</u>: To examine the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood, and investigate gender and racial differences in this relationship.**

II.2. Dimensions of Adolescent Friendships

This section presents definitions for the friendship dimensions that will be the focus of this study, explores potential interactions among these dimensions, examines the friendship dimensions of adolescents with high-risk behaviors and finally explores racial and gender differences in adolescent friendships.

II.2.1. Definition of Friendship Dimensions

Three different dimensions of adolescent friendships have been used in research, most often independently: friendship quantity, quality and the identity of one's friends (Berndt & Murphy, 2002; Hartup, 1995; Hartup & Stevens, 1997). Friendship quantity refers to the *number of friends* the person has. Friendship quality encompasses several elements including *normative functions* (activities friends engage in), *constructiveness* (how they resolve conflicts), *closeness* (how much time they spend together and how many activities they engage in), *symmetry* (balance of power in the relationship), and *affective character* (if friendships are supportive). Finally, the identity of one's friends refers to the behavioral and psychological characteristics of the friends (Hartup & Stevens, 1997).

Closeness to friends is an important aspect of the quality of adolescent friendships, as it increasingly manifests itself in this stage of life (Crosnoe, 2000; McNelles & Connolly, 1999). Closeness has been defined as either behaving close (behavioral closeness), which shows through the frequent engagement in shared activities, or feeling close (emotional closeness), which is indicated by feeling loved by and cared for by friends (Aron et al., 1992). As such, close friendships represent the main avenues where adolescents learn about new behaviors and skills that will help them through adolescence and impact their development (Giordano et al., 1998).

II.2.2. Interactions among Friendship Dimensions

All three dimensions of friendships, the number of friends, the quality of the friendship and the friends' identity, have been related to adolescent health and social outcomes, but two points regarding these associations are proposed. First, the strength of the relationship between friendship

11

dimensions and adolescent outcomes varies by dimension, with the quality of adolescent friendships, rather than quantity, shown to be more strongly associated with indicators of adolescent adjustment, including positive affect and substance use (Hartup & Stevens, 1997; Hussong, 2000). The friend's identity has also been linked to adolescent outcomes, mainly through the influence of friends' behavior on adolescents' own behavior. Second, recent research suggests that friendship dimensions interact to predict adolescent outcomes and therefore considering each dimension, namely having friends, the quality of the friendship and the identity of the friends, as an independent predictor of adolescent and young adult outcomes might generate misleading conclusions (Berndt, 2004; Giordano, 2003; Hartup, 1996). For example, establishing high-quality friendships with delinquent friends or with friends who are substance abusers or high-risk takers may actually have a detrimental effect on adolescents' well-being (Berndt, 2004; Hartup, 1996) by facilitating their imitation of the behavior of their substance-using friends (Urberg et al., 2003).

There are two main lines of research investigating adolescent friendships: (1) research looking at the effect of friends' influence on adolescent behavior, and (2) research examining the influence of friendship characteristics on adolescent adjustment and development (Berndt & Murphy, 2002; Hartup, 1996). Berndt and Murphy (2002) best summarize this dichotomy as follows:

> "Studies of friends' influence focus on *individuals and their characteristics*. Studies of the influences of friendships focus on the *relationships* between individuals. Even more striking is the difference in presuppositions about the outcome of influence. The central question in research on *friends' influence* has been whether children's attitudes and behaviors are negatively affected by their interactions with friends. By contrast, the central question in research on *friendships* has been whether children's social and psychological adjustment is positively affected by having high-quality friendships." (p.294)

These two lines of research have rarely converged and researchers interested in the influence of friends on adolescents' behavior have seldom accounted for the quality of their friendships. Conversely, those interested in the influence of friendship quality have rarely examined the characteristics and behaviors of the friends.

However, recently, researchers began to acknowledge the need to bring together both perspectives to better capture how friends and friendships contribute to adolescent development. Researchers investigating friends' influence have recognized that the influence may depend on the strength of the friendship bond (i.e. friendship quality), while those examining friendship quality have realized that its impact on adolescent development is contingent on the friends' identity. While there have been a few studies incorporating friendship quality as a moderator of the relationship between friends' influence and behavioral outcomes such as delinquency (Haynie, 2001, 2002), sexual activity (Billy & Udry, 1985), and substance use (Urberg et al., 2005; Urberg et al., 2003; T. A. Wills & Vaughan, 1989), research into the moderating effects of friends' identity on the relationship between friendship quality and adolescent behavioral outcomes is still lagging behind. This may be due to the fact that the line of research examining the effects of friendship quality is firmly rooted in the theoretical stance that high-quality relationships are linked to better adaptation and prosocial behavior, regardless of the characteristics of the socializing agents (e.g., attachment theory, social support theory) (Giordano, 2003). A corollary of this perspective is that youth with problem behaviors lack close relationships [e.g., Hirschi's (1969) Social Control Theory]. However, conflicting research findings make it necessary to re-evaluate this perpective (Giordano, 2003; Hartup, 1995, 1996). In addition, new emphasis on developmental research has expanded the focus of the assessment of the influence of friendship quality beyond social and psychological adjustment to include behavioral adjustment as well (Feldman et al., 1995; Giordano et al., 1998; Zimmer-Gembeck et al., 2004), thereby increasing the importance of accounting for the friends' behavior.

This study will examine the moderating influence of friends' behaviors, specifically their STI/HIV risk behaviors, on the relationship between friendship quality or quantity on the one hand, and emerging adults' STI/HIV risk behaviors on the other, controlling for respondents' baseline STI/HIV risk behaviors. Given the dearth of research examining (1) the influence of friendship quality on adolescent STI/HIV risk behaviors, and (2) the interaction between the different friendship dimensions, this study will make a much needed contribution to the adolescent friendship literature.

Another strength of this study is its use of friends' own self-reports of injection drug use and sexual activity to measure their STI/HIV risk behaviors. Most studies looking at the influence of friends' behavior rely on adolescents' *perceptions* of their friends' behavior, which are not usually concordant with the friends' actual behavior (K. E. Bauman & Ennett, 1996; Norton et al., 2003; Prinstein & Wang, 2005).

II.2.3. Friendships of Adolescents with High-Risk Behaviors

Mixed findings have been reported regarding the friendship quality and quantity of adolescents with behavioral problems. While some authors depict them as close, warm and affectionate (Cairns & Cairns, 1994; Giordano, 2003), others describe them as lacking these characteristics (most notably, Hirschi (1969)). For example, Cairns and Cairns (1994) found that highly delinquent youth had as many reciprocated and close friends as non-delinquent control subjects. Similarly, Giordano and colleagues (1998) found that adults who had higher involvement in crime or in physical violence in romantic relationships did not report less intimate friendships in adolescence. Conversely, Hirschi (1969) has stated early on that youth who have problem behaviors lack close interpersonal relationships, a finding supported by Poulin and colleagues (1999), who suggest that the friendships of antisocial children are of "low quality," lack support and are characterized by negative interactions.

Research also has shown that there is as much variation among friendships of adolescents with behavioral problems as among those in the general adolescent population. For example, Giordano and colleagues (1986) suggest that there are many similarities between the friendships of adolescents with varying levels of delinquency: In their study of the friendship experiences and delinquency involvement of a large sample of adolescents (n=942), all respondents reported equal levels of caring and trust within their relationships, as well as no differences in the frequency of interaction with friends, a finding supported by Haynie (2002), or in the length of time respondents reported being friends.

Studies have also shown that peer groups are homogenous with respect to engagement in risk behavior (Ennett et al., 1994). Examining smoking behavior within and between friendship groups among 9th graders in one county in North Carolina, Ennett et al., (1994) concluded that adolescents belonging to the same friendship group were similar in their smoking behavior. Therefore, although peer groups may include members with varying levels of risk (Elliott & Menard, 1996; Haynie, 2001, 2002), most individuals in the group share similar behavioral characteristics.

One of this study's strengths is in examining the different dimensions of adolescent friendships (friendship quantity, quality and friends' STI/HIV risk behaviors) among a large sample of adolescents with varying levels of STI/HIV risk behaviors, thus allowing for a comparison of the friendship characteristics of adolescents with different levels of involvement in STI/HIV risk behaviors.

II.2.4. Racial and Gender Differences in Friendship Dimensions

Research on adolescent friendships has generally considered White middle-class samples (Lerner et al., 2001). However, the few studies that have examined friendships of minority adolescents suggest that there are significant racial differences in the quality and characteristics of the friendships (Way & Chen, 2000; Way et al., 2001). Early studies have postulated that Black adolescents are more peer-oriented than Whites to compensate for assumed deficits in the family (the "compensation argument" e.g., Silverstein and Krate, in (Giordano et al., 1993)). However, alternative – and more recent – studies report that Blacks are actually less susceptible to peer influence than Whites, especially with respect to risk behaviors, including sexual activity (Billy & Udry, 1985; Cavanagh, 2004; Giordano, 2003; Giordano et al., 1993; Udry & Billy, 1987). These studies have also reported that Blacks are less close to their friends and rate having close friends as less important than White adolescents (Giordano et al., 1993; Larson et al., 2001). The present study's use of a large nationally representative sample of adolescents will allow for the examination of the friendship dimensions among different racial groups. Given that this study also includes adolescents with varying levels of involvement in STI/HIV risk behaviors, it will be possible to examine the racial

differences among adolescents at different risk for STI/HIV. This analysis will prove particularly useful for furthering our understanding of the similarities and differences of friendship characteristics among these groups.

Unlike racial differences in adolescent friendships, gender differences have been investigated more frequently, with most research converging on the conclusion that friendships among boys and girls are different (Parker & Asher, 1993). Females have been shown to spend more time with and be closer to their friends than males (Crosnoe, 2000; Giordano et al., 1998; Parker & Asher, 1993; Roy et al., 2000). The way closeness is established also differs by gender, with girls fostering closeness and intimacy through conversation and self-disclosure and boys building close relationships by engaging in shared activities and structured games (Cavanagh, 2004; McNelles & Connolly, 1999; Roy et al., 2000; Youniss & Haynie, 1992). Most studies have used "female-oriented" definitions of closeness to assess closeness among males: closeness has usually been measured in terms of intimacy and self-disclosure (i.e., emotional closeness), which are not necessarily good indicators of closeness for males, thereby resulting in an underestimation of closeness among this population (Camarena et al., 1990). This study will address this gap by considering both dimensions of closeness. It will therefore be one of the few studies to compare close relationships among adolescent boys and girls of various racial groups and assess the influence of these relationships on their STI/HIV risk behaviors.

Based on the above review on adolescent friendships, the second aim of this study is as follows:

> **Study Aim II: To examine the association between adolescents' STI/HIV risk behaviors and three friendship dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk behaviors; and to determine whether the association varies by gender and race.**

II.3. Friendships in Adolescence and STI/HIV Risk Behaviors in Emerging Adulthood

This section presents the empirical evidence relating to the long-term impact of adolescent friendships and the shortcomings of the available studies investigating this issue. Only a few studies

16

have examined the impact of adolescent friendships on outcomes in adulthood and fewer have considered their relationships to STI/HIV risk behaviors. However, the findings from the studies available so far (as well as the theoretical evidence presented in the next section) suggest that future studies should further investigate this issue to broaden our understanding of the long-term impact of adolescent friendships.

II.3.1. Long-Term Effects of Adolescent Friendships on STI/HIV risk behaviors

II.3.1.1. General Evidence on the Long-Term Effects of Adolescent Friendships

An essential goal for research on adolescence is to determine to what extent this developmental period affects subsequent "stages in life" (Bates & Labouvie, 1997; Caspi et al., 1998; Elder, 1998; Macmillan & Hagan, 2004; Pulkkinen & Caspi, 2002). Given that there is individual variation in the development of risk behaviors among adolescents, identifying factors in adolescence that could bear a long-term effect on STI/HIV risk behaviors would prove useful for prevention research (Bates & Labouvie, 1997; Steinberg & Lerner, 2004; Steinberg & Morris, 2001) and could help differentiate between adolescents who sustain high levels of involvement in STI/HIV risk behaviors in emerging adulthood and those who do not.

The influence of peer relationships in one period of life on behavioral, social and health outcomes in future stages of life has been investigated among both children and adolescents. Studies on childhood peer relationships have demonstrated that childhood friendships may affect adolescent and young adult outcomes such as antisocial behavior (Nelson & Dishion, 2004), delinquency and depression (Bohrnstedt & Fisher, 1986; Kupersmidt & Coie, 1990; Parker & Asher, 1987), and the quality of adult relations (Capaldi et al., 2001; Giordano et al., 1998). Studies on adolescent peer relationships have shown that friendship quality has often been associated with the quality of emerging adults' interpersonal relations (Capaldi et al., 2001; Giordano et al., 1998), and reproductive health outcomes such as number of sexual partners and adolescent childbearing (Feldman et al., 1995; Underwood et al., 1996). Further, friends' risk behavior in adolescence has been shown to influence emerging adults' own behavior, especially with respect to substance use (Andrews et al., 2002;

17

Chassin et al., 2002; Duncan et al., 1998; Griffin et al., 2002), but findings here are inconclusive, with some studies failing to demonstrate that adolescent friendships predicted substance use (Bates & Labouvie, 1997; Engels et al., 1999; Oygard et al., 1995; West et al., 1999). Finally, a higher number of close friendships in adolescence has been associated with less depression in adulthood (Bohrnstedt & Fisher, 1986). Given that friendships appear to be linked to outcomes in young adulthood, they could be useful for the early differentiation between individuals with varying levels of STI/HIV risk behaviors.

This study will add to this line of research by examining the long-term influence of adolescent friendships on emerging adults' STI/HIV risk behaviors. It will provide further information on the appropriateness of considering adolescent friendships as useful predictors of behavioral and health outcomes in adulthood. In addition, while other studies have exclusively looked at single friendship dimensions to predict outcomes in young adulthood (e.g., either friendship quality or quantity or friends' risk behavior), this study will examine friendship quantity, quality and the friends' STI/HIV risk behaviors in an effort to best understand the influence of friendships on emerging adults' STI/HIV risk behaviors.

II.3.1.2. Long-Term Effects of Adolescent Friendships on STI/HIV Risk Behaviors

The association between friendships in adolescence and STI/HIV risk behaviors (risky sexual behavior and injection drug use) has been investigated – albeit not extensively – but findings are inconclusive. Research investigating this association has usually considered the relationship between friendships in adolescence and sexual behavior or substance use in general (no identified study specifically relating to injection drug use). The present study, however, integrates sexual behavior and injection drug use measures to create a single indicator – STI/HIV risk behaviors – which assesses individuals' involvement in behaviors that put them at risk of STI/HIV transmission. Given that no identified studies examined the link between friendships in adolescence and the composite measure of STI/HIV risk behaviors or injection drug use, this review will present information on the relationship of adolescent friendships to risky sexual activity.

Studies that sought to identify the effect of friendship quality or quantity on sexual risk behavior concluded that friendship quality at age 12-13 predicted sexual behavior (number of sexual partners) at age 19 (Zimmer-Gembeck et al., 2004), and that peer acceptance (a measure of popularity that could relate to "number of friends") in childhood was positively associated with number of sexual partners in adolescence (Feldman et al., 1995). Finally, the following study measured the long-term impact of adolescent friendship (although the sample was not followed into adulthood): Stanton et al (2002) showed that adolescents' perception of peer sexual involvement was significantly associated with youth sexual behavior through all four years of follow-up.

In conclusion, this review suggests that findings regarding the influence of friendships in adolescence on outcomes including STI/HIV risk behaviors in emerging adulthood are inconclusive. As will be detailed in the next section, several shortcomings of the available research may be responsible for the conflicting findings.

II.3.2. Shortcomings of Current Studies Examining the Long-Term Effects of Adolescent Friendships

II.3.2.1. Paucity of Research Addressing this Issue

Despite recognizing the potential long-term impact of adolescent friendships, few studies have attempted to explore their usefulness in predicting young adults' outcomes beyond general adjustment (e.g., dropping out of school, antisocial behavior), especially among adolescents with high-risk behaviors. Research suggests that making friends and having good quality friendships is good for development (Giordano et al., 1998; Hartup & Stevens, 1997), yet it is not clear how this applies to adolescents with high-risk behaviors. If "youth who have enjoyed close friendships in childhood and adolescence should be better off, from a developmental standpoint, than those whose relations have been less intimate or rewarding,"(Giordano et al., 1998) then adolescents with high-risk behaviors who succeed in establishing close friendships should successfully transition to young adulthood, which could be illustrated by a decrease in their risk behavior. However, studies reviewed previously indicate that good quality friendships and having many friends do not necessarily entail

19

positive outcomes for adolescents, likely because effects depend on who the friend(s) is (are). Hartup and Stevens (1997) suggest that friends who are "normatively conventional" may be beneficial for adolescents' development, whereas those who are not may be detrimental. How detrimental to adolescents' development their friends with high-risk behaviors may depend on the quality of their relationship with them: the closer the friendships (i.e., the higher their quality), potentially the more deleterious the effects. These conclusions are mainly based on studies of the general adolescent population, and to a lesser extent, on studies of delinquents and adolescents with antisocial behavior. More research is needed to replicate these findings among adolescents with other risky behaviors, including those related to the transmission of STI/HIV.

II.3.2.2. Failing to Integrate the Different Dimensions of Adolescent Friendships

Several shortcomings are to be noted among longitudinal studies investigating the effects of adolescent friendships on outcomes in adulthood, specifically relating to STI/HIV risk behaviors.

First, studies that deal with adolescent friendship quality have generally paid little attention to whether or not quality predicts adult behavioral adjustment (Hartup & Stevens, 1997), especially in terms of sustaining or discontinuing high-risk behaviors initiated in adolescence, such as STI/HIV risk behaviors. However, the few studies that have examined the long-term influence of the quality of adolescent friendships concluded that friendship quality may be associated with behavioral outcomes in adulthood, such as sexual behavior (e.g., Zimmer-Gembeck's study, (2004) shows that higher friendship quality is associated with a higher number of sexual partners), hence suggesting that further investigation could be helpful.

Second, studies examining the effect of friendship experiences on adult outcomes have looked separately at the different dimensions of adolescent friendships, such as number of friends an adolescent has, the quality of the friendship and the friends' identity (e.g., their risk behaviors). Yet, as Hartup (1996) proposes, all three dimensions might interact and it is necessary to look at this interaction to get a thorough understanding of the friendship effect. In fact, the mixed findings regarding the associations between adolescent friendships and adult outcomes may result from a

failure to investigate an interaction between the quality of the friendships and the friends' risk behaviors. For example, Giordano and colleagues' (1998) study investigated the association between intimacy and adult outcomes without considering who the adolescent's friends were, and therefore assumed that establishing intimacy with deviant and non-deviant friends produced similar effects. However, being intimate with deviant friends may prove deleterious to the adolescent's well-being as the activities that they engage in may not be pro-social. Conversely, studies examining the impact of friends' smoking in adolescence on young adults' smoking did not find any association (Oygard et al., 1995; West et al., 1999). Failure to consider the interaction of friends' smoking with friendship quality (e.g., closeness to the peers, activities engaged in), could havea possibly contributed to the lack of association.

II.3.2.3. Lack of Theoretical Perspective

The majority of the studies examining the long-term influences of adolescent friendships have not framed their research within a theoretical or conceptual framework. This is particularly true of studies examining the long-term influences of adolescents' friends' behavior (as opposed to friendship quality or number of friends) (see studies by (Bates & Labouvie, 1997; Engels et al., 1999; Oygard et al., 1995; Stanton et al., 2002; West et al., 1999). Most notable is the nonuse of developmental perspectives that provide useful frameworks for linking events across the life course. Significant exceptions are the studies by Zimmer-Gembeck et al. (2004) and Feldman et al. (1995) that provide a theoretical context that links friendships in adolescence to sexual behavior in emerging adulthood, and the study by Schulenberg and Maggs (1996) that uses a developmental perspective to explain alcohol use during adolescence and the transition to young adulthood. Although these studies used a theoretical framework to link friendships in adolescence to substance use and sexual behavior in adulthood, they considered only one aspect of friendship (friendship quality) and did not account for the friends' behavior. As will be detailed in the next section, this study will use both developmental and behavior change theories to explain the influence of adolescent friendships on emerging adults' STI/HIV risk behaviors.

21

Based on the above review on the long-term impact of adolescent friendships, the third aim of this study is as follows:

> **Study Aim III**: **To examine the effects of interactions among friendship dimensions in adolescence on emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk behaviors; and investigate gender and racial differences in these associations.**

II.4. Theoretical and Conceptual Influence

This section presents the theories informing this study. First, the developmental theories will be discussed, followed by primary socialization theory. Finally, the rationale for integrating both theoretical perspectives, a major contribution of this study, will be presented.

II.4.1. Developmental Theories

Adolescence and emerging adulthood are life stages characterized by intense change that shapes development and underlies both positive and negative outcomes experienced by young people (Arnett, 2000; Lerner et al., 2005; Lerner et al., 2001). A developmental perspective is therefore useful to examine behavior change in these periods. This perspective acknowledges that behavior is the outcome of both current and past psychological, social, environmental and cultural factors (Sroufe, 1997; Udry et al., 1995; Vaughn, 2005). A key assumption of this perspective is that it is possible to alter the course of development, but that the longer individuals stay on a specific trajectory (either positive or negative) the harder it is to draw them away from it (Lerner & Castellino, 2002; Sroufe, 1997; Vaughn, 2005). A developmental perspective is therefore especially helpful for the early identification of adolescents who are at risk of sustaining or increasing their risky behaviors.

Two theories of development are particularly useful to understand the relationship between adolescent friendships and emerging adults' substance use and sexual behavior risk profiles: Sroufe's organizational-developmental theory (Roisman et al., 2004; Sroufe, 1979) and Collins' developmental perspective on relationships (W. A. Collins, 1997). Both are based on the two premises that individuals' past circumstances bear an impact on their present and future, and that relationship experiences are crucial for normative developmental processes (W. A. Collins, 1997; Crosnoe, 2000;

Giordano et al., 1998; Hartup, 1989; Hartup et al., 1993; Hartup & Stevens, 1997; Roisman et al., 2004; Sroufe, 1997). Sroufe's (1979) organizational-developmental theory is derived from a synthesis of the concept of developmental tasks and Bowlby's attachment theory (Roisman et al., 2004). It suggests that each developmental stage is characterized by fundamental tasks, defined by the cultural-environmental context. Mastering these tasks facilitates adaptation in the corresponding developmental period and predicts success in the next (Roisman et al., 2004; Sroufe, 1979), while failing in these tasks could lead to behavioral problems (Catalano et al., 2002). In Western societies, forming and maintaining friendships are considered to be critical components of healthy adaptation in adolescence (Capaldi et al., 2001; Goldstein et al., 2005; Hartup, 1989, 1996; Maggs & Hurrelmann, 1998; Petersen, 1988; Roisman et al., 2004; Waters & Sroufe, 1983) and have been linked to benefits such as social support and the building of social skills for effective communication and conflict resolution (Giordano et al., 1998; Goldstein et al., 2005; Maggs & Hurrelmann, 1998; Youniss & Haynie, 1992). Forming and maintaining friendships confer then both short-term advantages (e.g., social support, acquisition of social skills, modeling of prosocial behaviors) and benefits that may extend beyond the adolescent years (Giordano et al., 1998; Parker & Asher, 1987).

Collins' developmental perspective on relationships (1997) contends that there is both continuity and change in relationships over time. Continuity transpires through the fact that the ability to form and maintain friendships is an enduring trait. People who experience difficulties in peer relationships in one developmental stage often do so in other stages as well (W. A. Collins, 1997; Hartup, 1996; Hartup et al., 1993). Continuity is also illustrated by the fact that the friends individuals make often share similar characteristics (Jaccard et al., 2005). Although adolescent friendships are often short-lived, an indication that relationships are dynamic and change over time, the friends we make often share similar characteristics with the ones we previously had (Jaccard et al., 2005). This theoretical perspective is relevant to this study because it suggests that although adolescent friendships used to predict emerging adults' substance use and sexual behavior will be

measured only at one time point, they can be construed as a proxy for friendship characteristics at other time points during adolescence.

II.4.2. Primary Socialization Theory

The developmental perspectives highlighted in the previous section attempt to explain why adolescent friendships might have a long-term impact on emerging adults' STI/HIV risk behaviors. This section highlights the usefulness of primary socialization theory (Oetting & Donnermeyer, 1998) in explaining that adolescent friendship dimensions (number of friends, quality of the friendship, friends' STI/HIV risk behaviors) interact to affect emerging adults' STI/HIV risk behaviors. Primary socialization theory posits that, in Western societies, adolescents are embedded in a primary socialization network, consisting of the family, school and peers, and that bonds between youth and each of these socializing agents are used to communicate norms. It further hypothesizes that, especially with respect to peers, adolescents are more likely to engage in deviant behavior if their friends are engaged in deviant behaviors because peer groups can transmit deviant norms. Furthermore, the likelihood that adolescents will imitate the behavior of their peers (whether prosocial or deviant) depends on the strength of their bond with them (Oetting & Donnermeyer, 1998). For the purpose of this study, closeness to friends (a dimension of friendship quality and a measure of the bond between adolescents and their friends) will predict the extent to which adolescents will imitate their friends' substance use and sexual risk behaviors. It suggests that bonding with peers with different levels of involvement in STI/HIV risk behaviors will have a differential impact on emerging adults' own STI/HIV risk behaviors.

II.4.3. Integrating Both Theoretical Perspectives

The developmental psychology literature includes extensive research on the significance of friendship formation and quality while the public health literature has mostly focused on the influence of friends' risk profile (Berndt & Murphy, 2002). This dichotomy is a reflection of a more general lack of integration between developmental theory, and research and prevention programming

24

(Catalano et al., 2002), and the fact that researchers from different disciplines often focus on different aspects of a problem (Petraitis et al., 1995). However, all three friendship dimensions are important to predict their effect on adolescent and emerging adult STI/HIV risk behaviors. Developmental theories suggest that having friends and forming high-quality friendships is beneficial to adolescents, while primary socialization theory proposes that friendships may not always be beneficial, depending on the characteristics of the friends, i.e., the characteristics of the friendship and that of the friends interact. Combining the strengths of both perspectives allows for a more comprehensive understanding of how adolescent friendships impact emerging adults STI/HIV risk behaviors. The relationship between friendship formation and quality, and emerging adults' STI/HIV risk behaviors may depend on friends' STI/HIV risk behaviors. Is it good "adaptation" if adolescents bond with friends with risky substance use and sexual behavior? From a developmental standpoint, making friends is considered an essential developmental task of adolescence that predicts positive outcomes, regardless of who the friends were. But having friends and forming close friendships with individuals with risky behaviors might be counter-productive and ultimately have a negative impact on adolescents' STI/HIV risk behaviors, as suggested by the primary socialization theory. This study examines the need to consider all dimensions of friendships and the contribution of different theoretical perspectives in predicting the impact of friendships on emerging adults' STI/HIV risk behaviors.

III. Conceptual Model, Research Questions, and Hypotheses

In this chapter, I describe the conceptual model for the study, define the study constructs, describe the conceptual model, and present the study aims, research questions and hypotheses.

III.1. Conceptual Model

III.1.1. Model Description

The conceptual model (Figure 1) is based on developmental theories (Sroufe's organizational-developmental theory and Collins' developmental perspective on relationships) and Primary Socialization Theory. The model depicts STI/HIV risk behaviors in adolescence (Wave I), number of friends (a dimension of friendship quantity) and closeness to friends (a dimension of friendship quality) as the predictors, STI/HIV risk behaviors in emerging adulthood (Wave III) as the outcome, and the friends' STI/HIV risk behaviors at Wave I (a measure of friends' identity) as the moderator of the relationship between the number of friends or closeness to friends on the one hand and STI/HIV risk behaviors in emerging adulthood on the other. Gender and racial differences in the predictors, outcome, and the relationship between both will also be examined. Control variables include the quality of adolescents' relationship with parents, adolescents' age, religiosity, SES and involvement in romantic relationships.

Figure III-1 - Conceptual Model for the Study Depicting the Relationships between the Number of Friends, Closeness to Friends, Friends' STI/HIV risk behaviors, and Adolescent and Emerging Adult STI/HIV risk behaviors.
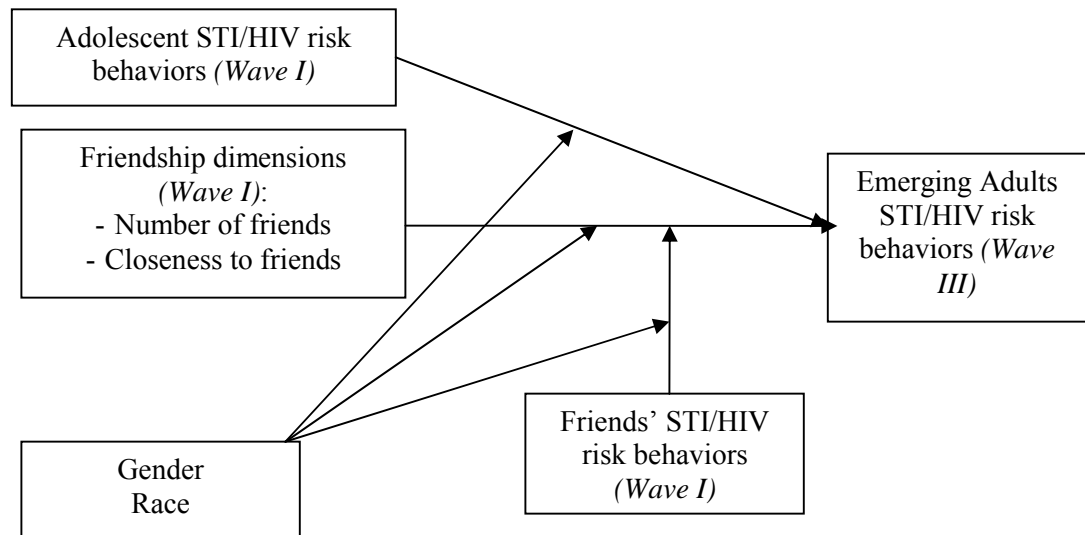
III.1.2. Conceptual Definition of the Study Variables

III.1.2.1. Adolescents' and Emerging Adults' STI/HIV risk behaviors

Adolescents' and emerging adults' STI/HIV risk behaviors are a composite measure of the sexual activities and drug use behaviors that directly influence STI/HIV transmission. Being sexually active, having a higher number of sexual partners and not using condoms increase adolescents' and emerging adults' risk for STI/HIV (Beadnell et al., 2005). In addition, the exchange of sex for drugs or money and injecting drugs have also been associated with an increased risk for STI/HIV(Centers for Disease Control and Prevention, 2005). The five key risk behaviors are therefore combined to create a scale that captures adolescents' and emerging adults' risk for STI/HIV.

III.1.2.2. Number of Friends

Number of friends is an indicator of friendship quantity. Developmental research generally

suggests that having more friends is beneficial for adolescents' development (Giordano, 2003;

Hartup, 1996). However, public health research often indicates that friends have a negative influence

on adolescents' behavior. In this study, *number of friends* will be measured as a continuous variable.

III.1.2.3. Closeness to Friends

Closeness to friends is a measure of friendship quality and indicates how much time

adolescents spend together and how many activities they engage in together (Hartup & Stevens, 1997;

McNelles & Connolly, 1999). It is further defined as (1) behaving close (*behavioral closeness*), which

is based on the frequency of engagement in shared activities, and (2) feeling close (*emotional*

closeness) indicated by feeling loved by and cared for by friends (Aron et al., 1992).

III.1.2.4. Friends' STI/HIV risk behaviors

Friends' STI/HIV risk behaviors refer to the friends' engagement in the sexual activities and

substance use behaviors that promote STI/HIV transmission. A scale of STI/HIV risk behaviors, for

each friend, is defined as a composite of the following behaviors: sexual activity (vaginal

intercourse), number of sexual partners, condom use, sex in exchange for drugs or money, injection

drug use and MSM. The scores for STI/HIV risk behaviors will be averaged across the friendship

group to determine the friends' overall STI/HIV risk behaviors.

III.1.2.5. Control Variables

Variables that will be controlled for in the analyses include respondents' *age*, the *quality of*

their relationship with their parents, *religiosity*, *socioeconomic status* and *involvement in romantic*

relationships because of their documented relationship with both the outcome (Duncan et al., 1999;

Fothergill & Ensminger, 2006; Giordano, 2003; T. A. Wills et al., 2003; Zweig et al., 2001) and

predictors (Giordano, 2003; Hartup & Stevens, 1997; Stanton et al., 2002; Urberg et al., 2003; Way &

Chen, 2000). The measurement of these variables will be presented in the following chapter.

III.2. Aims, Research Questions and Hypotheses[1]

III.2.1. Aim I

Aim I: *To examine the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood, and investigate gender and racial differences in this relationship.*
Sample: *Add Health saturation sample, Waves I and III.*

RQ1. What is the relationship between STI/HIV risk behaviors in adolescence (Wave I) and those in emerging adulthood (Wave III)?

H 1.1 There will be a positive relationship between STI/HIV risk behaviors in adolescence (Wave I) and those in emerging adulthood (Wave III).

RQ2. Does the relationship between STI/HIV risk behaviors in adolescence (Wave I) and those in emerging adulthood (Wave III) vary by gender, and race?

H 2.1 The relationship between STI/HIV risk behaviors in adolescence (Wave I) and in emerging adulthood (Wave III) is moderated by gender, such that there will be a stronger positive relationship for males than for females.

H 2.2 The relationship between STI/HIV risk behaviors in adolescence (Wave I) and in emerging adulthood (Wave III) is moderated by race, such that there will be a stronger positive relationship for Blacks than for Whites.

Rationale for hypotheses 2.1 – 2.2

Research suggests that males are more likely than females to engage in risky substance use

and sexual behavior (Courtenay et al., 2002; Halpern et al., 2004; Schulenberg et al., 1996) and are

more likely to escalate their risky substance use over time (Chassin et al., 2002; Ellickson et al., 2004;

Harris et al., 2006; Schulenberg et al., 1996). For example, Harris and colleagues (2006) analysis of

gender differences in selected risk behaviors in adolescence and emerging adulthood indicated that

males experienced a greater increase in risk behaviors such as marijuana use and drug use than

females. In addition, a study investigating sexual risk-taking among adolescents in 7th to 12th grade

has shown that more boys than girls consistently engage in higher risk-taking at all age groups

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[1] The study sample will be described in detail in the next chapter, but a brief definition is included here to understand how the research questions are framed. Add Health *in-home Waves I & III* refer to the general Add health sample of adolescents, selected from 132 schools, who were interviewed in 1995 (Wave I) and six years later (Wave III). The Add Health *saturation sample* includes the subset of students from 16 schools. All students in these schools were included in the Add Health study to allow for the examination of full social networks.

(Beadnell et al., 2005). Therefore, males are hypothesized to be more likely than females to increase their STI/HIV risk behaviors during the transition to emerging adulthood.

Racial differences in drug use, sexual behavior and STI have been reported among US adolescents, with minority youth disproportionately affected by STI/HIV, and more likely to engage in risky sexual practices than non-Hispanic Whites (Centers for Disease Control and Prevention, 2004; Morris et al., 2006). Racial disparities in changes in substance use and sexual behavior during the transition from adolescence to emerging adulthood also exist: In the first study to explore longitudinal changes in racial and gender disparities in risk behaviors from adolescence to emerging adulthood, Harris and colleagues (2006) reported that Black adolescents, especially females, experienced the highest increases in STD diagnosis, as compared to all other racial groups and males. Unfortunately, no information was reported on specific sexual practices. Based on these findings, Black adolescents are hypothesized to be more likely than White adolescents to increase their STI/HIV risk behaviors during the transition to emerging adulthood.

III.2.2. Aim II

Aim II: *To examine the association between adolescents' STI/HIV risk behaviors and three friendship dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk behaviors; and to determine whether the association varies by gender and race.*
Sample*: Add Health saturation sample, Wave I.*

RQ3.   Are STI/HIV risk behaviors in adolescence associated with number of friends, emotional and behavioral closeness to friends, and friends STI/HIV risk behaviors?

H 3.1   STI/HIV risk behaviors in adolescence are not associated with number of friends.

H 3.2   STI/HIV risk behaviors in adolescence are not associated with emotional and behavioral closeness to friends.

H 3.3   STI/HIV risk behaviors in adolescence are positively associated with friends' STI/HIV risk behaviors.

Rationale for hypotheses 3.1 – 3.3
        Recent research has shown that there is as much variation in friendships among adolescents with behavioral problems as among friendships in the general adolescent population. For example, Giordano and colleagues (1986) suggest that there are many similarities between the friendships of

adolescents with varying levels of delinquency: adolescents included in her study reported no differences in the frequency of interaction with their friends, a finding supported by Haynie (2002). Therefore adolescents with varying levels of STI/HIV risk behaviors are hypothesized to report similar number of friends (H 3.1) and closeness to friends (H 3.2).

Research indicates that friendship groups generally tend to be homogenous with respect to risk behaviors (Ennett et al., 1994). I therefore hypothesize that, across all levels of STI/HIV risk behaviors, adolescents' friendship groups will report an average level of involvement in STI/HIV risk behaviors similar to the adolescents themselves.

RQ4. Does the association between STI/HIV risk behaviors in adolescence and number of friends, emotional and behavioral closeness to friends, and friends STI/HIV risk behaviors vary by gender and race?

H 4.1 The association between ST/HIV risk behaviors in adolescence and number of friends does not vary by (1) gender, or (2) race.

H 4.2 The association between ST/HIV risk behaviors in adolescence and emotional and behavioral closeness to friends does not vary by (1) gender, or (2) race.

H 4.3 The association between ST/HIV risk behaviors in adolescence and friends' STI/HIV risk behaviors does not vary by (1) gender, or (2) race.

RQ5. Are the three friendship dimensions (number of friends, emotional and behavioral closeness to friends, and friends STI/HIV risk behaviors) associated with race and gender?

H 5.1 Black adolescents will report fewer friends than White adolescents.

H 5.2 Black adolescents will report less emotional and behavioral closeness to their friends than white adolescents.

H 5.3 The mean level of friends' STI/HIV risk behaviors will not differ between Black and White adolescents.

H 5.4 Number of friends will not be associated with gender.

H 5.5 Male adolescents will report less emotional closeness to their friends than female adolescents.

H 5.6 Female adolescents will report less behavioral closeness to their friends than male adolescents.

H 5.7 The mean level of friends' STI/HIV risk behaviors will not differ between male and female adolescents.

<u>Rationale for hypotheses 4.1 – 5.7</u>

Research on adolescent friendships has often considered White middle-class samples (Lerner et al., 2001). However, the few studies that have examined friendships of minority adolescents suggest that there are significant racial differences in the quality and characteristics of their friendships (Way & Chen, 2000; Way et al., 2001). Recent studies have suggested that Black adolescents have lower levels of closeness to friends and rate having close friends as less important than White adolescents (Giordano et al., 1993; Larson et al., 2001). Hence, Black adolescents are hypothesized to have fewer friends than White adolescents (H 4.1) and be less close to them (H 4.2). Finally, given that peer networks are usually homogenous (Ennett et al., 1994), I expect Black and White adolescents to be equally likely to have friends' with similar STI/HIV risk behaviors.

Gender differences in adolescent friendships have also been reported (Parker & Asher, 1993). Adolescent females have been shown to have as many friends as adolescent males (Roy et al., 2000), but to be closer to their friends than adolescent males (Giordano et al., 1998; Parker & Asher, 1993; Roy et al., 2000). However, the way closeness is established differs by gender, with girls fostering closeness and intimacy through conversation and self-disclosure (i.e., emotional closeness) and boys building close relationships by engaging in shared activities and structured games (behavioral closeness) (Cavanagh, 2004; McNelles & Connolly, 1999; Roy et al., 2000; Youniss & Haynie, 1992). Most studies have used "female-oriented" definitions of closeness to assess closeness among males; closeness has usually been measured in-terms of intimacy and self-disclosure (i.e., emotional closeness). Since these are not necessarily good indicators of closeness for males, an underestimation of closeness among boys may exist. In this study, I measure both types of closeness and hypothesize that males are less likely to experience emotional closeness than females (H 4.5), but more likely to experience behavioral closeness (H 4.6). There is no evidence suggesting that the number of friends or the variation in friends' risk behaviors differs between males and females. I therefore hypothesize that both groups will not differ on these two dimensions of friendship (H 4.4; H 4.7).

III.2.3. Aim III

Aim III: *To examine the effects of interactions among friendship dimensions in adolescence on emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk behaviors; and investigate gender and racial differences in these associations.*
Sample: *Add Health saturation sample, Waves I & III.*

RQ6.   Do friends' STI/HIV risk behaviors moderate the relationship between the number of friends the adolescents have and their STI/HIV risk behaviors in emerging adulthood (Wave III)?

H 6.1: Controlling for adolescents' STI/HIV risk behaviors at Wave I, the relationship between the number of friends adolescents have and their STI/HIV risk behaviors in emerging adulthood (Wave III) is moderated by the adolescents' friends' STI/HIV risk behaviors, such that adolescents who have a higher number of friends and whose friends have fewer STI/HIV risk behaviors are more likely to decrease their STI/HIV risk behaviors than those who have a higher number of friends but whose friends have more STI/HIV risk behaviors.

RQ7.   Do friends' STI/HIV risk behaviors moderate the relationship between adolescents' emotional and behavioral closeness to their friends and their STI/HIV risk behaviors in emerging adulthood (Wave III)?

H 7.1: Controlling for adolescents' STI/HIV risk behaviors at Wave I, the relationship between adolescents' behavioral closeness to their friends and their STI/HIV risk behaviors in emerging adulthood (Wave III) is moderated by the adolescents' friends' STI/HIV risk behaviors such that adolescents who are behaviorally close to their friends and whose friends have fewer STI/HIV risk behaviors are more likely to decrease their STI/HIV risk behaviors than those who are behaviorally close to their friends but whose friends have more STI/HIV risk behaviors.

H 7.2: Controlling for adolescents' STI/HIV risk behaviors at Wave I, the relationship between adolescents' emotional closeness to their friends and their STI/HIV risk behaviors in emerging adulthood (Wave III) is moderated by the adolescents' friends' STI/HIV risk behaviors, such that adolescents who are emotionally close to their friends and whose friends have less STI/HIV risk behaviors are more likely to decrease their STI/HIV risk behaviors than those who are emotionally close to their friends but whose friends have more STI/HIV risk behaviors.

Rationale for hypotheses 6.1; 7.1 – 7.2

Developmental theories (Sroufe 1979, Collins 1997?) suggest that relationships are crucial

for adolescent development. However, primary socialization theory suggests that the benefits of

friendships depend on the friends' risk behaviors. Therefore I hypothesize that friends' STI/HIV risk

behaviors moderate the relationship between the number of friends adolescents have (H 5.1),

adolescents' behavioral (6.1) and emotional (6.2) closeness to their friends, and the extent of

involvement in STI/HIV risk behaviors in emerging adulthood.

RQ8.   Do the moderation models tested in Research Questions 6 & 7 vary by gender and race?

H 8.1: The moderation models tested in RQ 6 & 7 are not expected to vary by gender.

H 8.2: The moderation models tested in RQ 6 & 7 are not expected to vary by race.

Rationale for hypotheses 8.1 – 8.2

        Research suggests that differences in outcomes among racial groups and gender are more likely due to differences in antecedents (which for this study include friendship dimensions – see Aim II) rather than to differences in developmental pathways (Goldstein et al., 2005; Laird et al., ; Pilgrim et al., 2006; Rowe et al., 1994). That is, it is likely that the moderation model will operate similarly among males and females (H 7.1) and Blacks and Whites (H 7.2), and that any observed differences in STI/HIV risk behaviors in emerging adulthood may be due to differences in friendship dimensions across gender and racial groups.

IV. Methods

This study uses data from Waves I and III of the contractual dataset of the National Longitudinal Study of Adolescent Health (Add Health) (Udry, 2003). Add Health is ideally suited to test this study's hypotheses for several reasons. First, analysis of the influence of friends' *self-reported* behavior (as compared to adolescents' *perceptions* of their friends behavior) on adolescents is only possible if data provided by adolescents and their friends can be linked, and if most links are available in the data. Add Health meets these requirements: All adolescents in 16 selected schools were asked to nominate their 10 best friends, who generally attended the same school as the adolescent. Given that all students in these 16 schools were included in the study, it is possible to establish linkages between the information provided by the adolescents and their friends. Second, Add Health's longitudinal design spanning the years from adolescence to adulthood is exceptionally useful to study adolescent development and assess how adolescence might impact future stages of life. Third, Add Health covers a wide range of behaviors, including substance use and sexual activity, thus allowing for the assessment of the co-occurrence of behaviors. Finally, because Add Health data are representative of all adolescents in 7th to 12th grade in the US in the 1994 – 1995 school-year, it is possible to generalize the findings pertinent to changes in STI/HIV risk to the general adolescent and emerging adult population and further examine variations by race.

In this chapter, I first describe the design of Add Health, the data collection methodology, and the eligibility criteria for the current study. I then provide the operational definition of the study variables and lay out the data analysis plan as it relates to the research questions and hypotheses.

IV.1. Data Source

IV.1.1. Study design

Add Health is a school-based, nationally representative, longitudinal study of the health-related behaviors of adolescents and their outcomes in young adulthood (Harris et al., 2003). Beginning in the 1994-1995 school year, adolescents in grades 7 through 12 were invited to join the study and completed an in-school questionnaire (Wave I- stage 1). A subset of adolescents was interviewed in their homes approximately one (Wave I – stage 2), two (Wave II) and six (Wave III) years later. Figure 2 depicts the sampling structure of Add Health.

Figure IV-1 - Sampling Structure for the Add Health Study

* Students in the PAIRS sample (the 2 purposively selected large schools), and those from the 14 smaller schools whose entire student body was included in the core sample form the "saturation" sample.
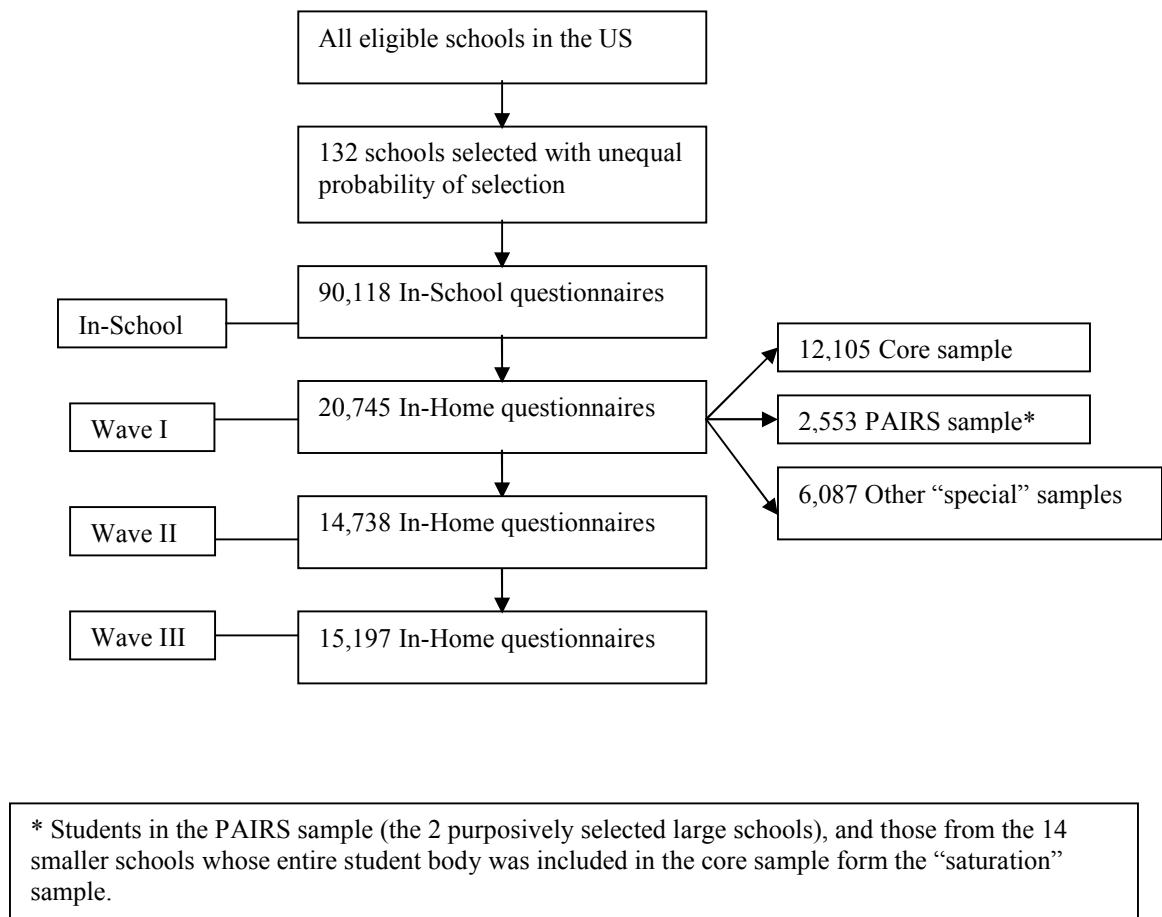
IV.1.1.1. Wave I- Stage 1: In-school sample

Schools are the primary sampling units and were identified from a stratified random sample of all public and private high schools in the United States, using a multi-stage sampling design. Prior to sampling, the high schools were stratified into clusters based on size, type, census region, urbanicity, percent white, percent black, curriculum and grade span. High schools were eligible for inclusion in the sample if they had an 11th grade and if they had a minimum enrollment of 30 students. Participating high schools were asked to identify feeder schools (junior high or middle schools that fed at least 5 graduates to the high school and that included a 7th grade). One feeder school was selected for each high school, with probability proportional to the number of students it contributed to the high school. However, some high schools were their own feeder schools, as they had grade ranges that included 7th or 8th grades. A total of 145 middle, junior high and high schools were selected, with unequal probability of selection, to participate in this first phase of the study, with a total of 90,118 students (Harris et al., 2003).

IV.1.1.2. Wave I – Stage 2: In-home sample

Participants in the in-home interviews were sampled from student rosters provided by 132 of the 145 schools of the original sample[1]. Students in each school were stratified by gender and grade, thus resulting in 12 student-level strata. The "core" sample of students consists of roughly equal-sized samples (about 17 students) drawn from these strata so that a total of about 200 students were selected from each school pair (100 from the high school and 100 from the feeder school). In addition, several "special"[2] samples were created to cover particular research interests. Of interest to this study is the

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[1]Thirteen schools were not included in the in-home sample selection between they were duplicate schools in the clusters. However, only one school per stratum was selected for the in-home interview.

[2] Special samples include the following: (1) a sample for a study of relationship patterns where all respondents were selected from two schools; (2) a genetic sample composed of siblings and twins; (3) a sample of unrelated adolescents who reside in the same household; and oversamples of (4) black adolescents with college educated parents; (5) Cuban and Puerto Rican adolescents; (6) Chinese adolescents; and (7) physically disabled adolescents.

special sample (PAIRS sample) created for the study of relationship patterns where all students in two purposively selected large schools were included in the study. These two large schools (with a total combined enrollment of 3300), in addition to 14 smaller schools (with enrollment fewer than 300) where almost all students were included in the core sample, form the "saturation sample." One of the large schools is predominantly white and is located in a mid-sized town. The other is ethnically heterogeneous and is located in a major metropolitan area. The 14 small schools, some public and some private, are located in both rural and urban areas. The overall number of participants in the Wave I in-home sample is 20,745 (Harris et al., 2003; Tourangeau & Shin, 1999).

IV.1.1.3. Wave II

All participants in Wave I, with the exception of 12th grade respondents who were not in the genetic sample, were eligible for inclusion in Wave II. The total sample includes 14,738 students (Harris et al., 2003).

IV.1.1.4. Wave III

Wave III respondents include all Wave I participants that the study team was able to locate and interview (15,170 adolescents or 73% of Wave I participants), in addition to a few participants from Wave II (27 adolescents who were part of the genetic sample). Participants were required to be at least 18 years old before being interviewed for Wave III. The total number of participants in Wave III is 15,197. In addition to these 15,197 respondents, 1,507 romantic partners of Add Health respondents were included in this Wave of the study (Harris et al., 2003). Chantala et al's (2004) analysis of non-response bias has shown that the Wave III sample represents the same population as the Wave I sample, with use of the correction weights.

IV.1.2. Data Collection

Protection of respondents' identities is a crucial concern for Add Health and is linked to the study's success. Therefore, for Waves I through III, a security system prevents linking respondents' answers to their name, but allows linking respondents questionnaires across all components of the study (Harris et al., 2003). The Add Health study was approved by The University of North Carolina at Chapel Hill School of Public Health's Institutional Review Board on February 28, 1994.

IV.1.2.1. In-school

In-school questionnaires were administered between September 1994 and April 1995. Most schools only required passive parental consent for students to participate in the study. Students completed a questionnaire during a 45- to 60-minute class period that covered topics relating to: students' and parents' background; friends; school life, work and activities; general health status; and health-related behaviors. Participating schools were asked to complete a school administrator questionnaire that collected information about the educational setting and the background of the school (Harris et al., 2003).

IV.1.2.2. In-home Waves I & II

In-home interviews were conducted between April and December 1995 (Wave I) and April and August 1996 (Wave II). Prior to the interview, the adolescent provided a written informed assent and his/her parent or guardian completed a written informed consent. The interview was administered by either a Computer-Assisted Personal Interview (CAPI) for non-sensitive questions, or an Audio Computer-Assisted Self Interview (ACASI) for sensitive questions. The questionnaire covered the following topics: health status; health facility utilization; nutrition; peer networks; decision-making process; family composition and dynamics; educational aspirations and expectations; employment experience; romantic partnerships; sexual partnerships; substance use; and criminal activities. A parent or guardian was interviewed at Wave I to obtain further information about the family composition and the adolescent's health history. Response rates for students' participation in Waves I and II were 78.9% and 88.2% respectively (Harris et al., 2003).

IV.1.2.3. In-home Wave III

Interviews were conducted between July 2001 and April 2002, when respondents were 18 to 26 years old. Data collection in this phase included both questionnaire administration and the collection of biological samples. Questionnaire administration was identical to that of Waves I & II with interviewers using the CAPI techniques. Interviews lasted about 90 minutes and the questionnaire covered a wide variety of topics ranging from risk behaviors to marriage and labor market experiences[3].   Respondents were then asked to provide urine and saliva samples to test for sexually transmitted diseases and HIV. The response rate for the Wave III interview was 77.4% (Harris et al., 2003).

IV.1.3. Sample Selection

This study will use the Add Health *saturation sample*, with measurements at Waves I and III to address all three aims.

IV.1.3.1. Comparison of the saturation sample to the other schools in the Add Health sample

Table IV.1 compares the 16 schools in the saturation sample to the other 116 schools of the general Add Health sample on the main sampling characteristics. These characteristics include: the size of the school (125 students or fewer; 126 to 350 students; 351 to 775 students; 776 or more students); the school type (public, catholic, private); the school's metropolitan location (urban, suburban, rural); the school's region (West, Midwest, South, Northeast) and the quartile percentage white (0%; 1-66%; 67-93%; 94-100%). The percentages in the table are weighted using an initial

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[3] The specific topics in the Wave III questionnaire are as follows: Add Health Picture Vocabulary Test; Overview and Demographics; Household Roster and Residence; History; Parental Support and Relationships; Retrospective ADHD; Relationships with Siblings; Friends; Education; Labor Market Experience and Active-Duty Military Service; General Health and Diet; Access to Health Services, Health Insurance; Illnesses, Medications, Physical Disabilities; Social Psychology and Mental Health; Mentoring; Marriage/Cohabitation History and Attitudes; Economics and Personal Future; Sexual Experiences and STDs; Table of Relationships; Table of Pregnancies; Relationships in Detail; BEM Inventory; Propensity for Risk; Completed Pregnancies; Current Pregnancies; Live Births; Children and Parenting; Delinquency and Violence; Involvement with the Criminal Justice System; Tobacco, Alcohol, Drugs, Self-Image; Mistreatment by Adults; Civic Participation and Citizenship; Religion and Spirituality; Gambling; Daily Activities; Biological Specimen Participation; Interviewer's Report.

school weight. Therefore, if there are no significant differences on these sampling variables between the saturation sample and the rest of the Add Health sample, it will be possible to consider that these 16 schools are, just as the general Add Health sample, representative of the schools in the US during the 1994-1995 year, and results of the study could therefore be generalized to the population of US adolescents.

Results of this comparison show that the schools in the saturation sample significantly differ from the schools that make up the rest of the Add Health sample on only 2 of the 5 sampling variables: School type and percent White. More schools in the saturation sample are Catholic and Private schools, as compared to the general Add Health sample (and therefore as compared to the national levels). The saturation sample is also more likely to include more White adolescents, as compared to other race/ethnicities. Given these differences between the saturation sample and the Add Health core sample, results of this study are not exactly representative of the US adolescent population.

IV.1.3.2. Study inclusion/exclusion criteria

Of the 20,745 respondents at Wave I, 3,702 were included in the saturation sample, and of those, 2,959 respondents completed questionnaires at Waves I and III. Of respondents who completed questionnaires at both waves, 2,934 respondents were included because they had valid sample weights at Wave III to ensure that results are nationally representative with unbiased estimates. The sample was further restricted to (a) Black and White adolescents (n=1,901); (b) adolescents who nominated at least one friend who was interviewed in Add Health (n=1,509); (c) adolescents with valid information on STI/HIV risk behaviors in adolescence (Wave I) (n=1,248); and (d) adolescents who had complete information on the friendship dimensions and the friends' STI/HIV risk behaviors for all their nominated friends who were included in the study (n=1,154). Figure 3 depicts the sample selection for the study. Justifications for restrictions 'a' through 'd' are as follows:

Restriction (a): Only Black and White adolescents were included in the study because of insufficient numbers in the other racial groups to ensure appropriate testing of the study hypotheses.

Restriction (b): The sample was further restricted to adolescents who nominated at least one friend who was interviewed in Add Health. Each adolescent in the saturation sample was given the opportunity to nominate up to 10 friends (5 male and 5 female). Those friends who attended either the same school as the respondent or the sister-school, and who could be located on the school roster, were interviewed. Restriction 'c' was applied because testing of several of the study hypotheses required the use of measures of friendship dimensions that could only be computed for respondents with at least one friend who was included in Add Health (e.g., emotional closeness, which was operationalized as the average number of reciprocated friendships in the group, required that both the adolescent and their friends be included in the study so that they have the opportunity to nominate each other).

Restriction (c): Only adolescents with valid information on STI/HIV risk behaviors in adolescence (Wave I) were included in the study. Two hundred and sixty-one missing data for STI/HIV risk behaviors at wave I were noted, for the sample of 1,509 Black and White adolescents with at least one nominated friend in the study (17.0%). Respondents with these missing cases were more likely to be male, Black and older. Eighty percent of respondents with missing data on STI/HIV risk behaviors at Wave I were male and 12.0% percent were Black, compared with 40.5% (p=0.00) and 6.0% (p=0.05), respectively, of respondents with no missing data on this variable. In addition, respondents with missing data on STI/HIV risk behaviors at Wave I were older than those with no missing data (b = -0.54 p = 0.00). The STI/HIV risk behaviors variable in adolescence was computed as the sum of the following sexual behavior measures and IV drug use (at Wave I): Ever had sex, number of sexual partners (ever), frequency of condom use (ever), exchange of sex for drugs/money (ever), IV drug use (ever) and Men having sex with men (MSM). Of these variables, MSM contributed the most missing cases to the overall STI/HIV risk behaviors variable (250 missing cases,

or 73% of the total 341 cases missing for STI/HIV risk behaviors). The MSM variable was, in turn, computed from 18 variables, 6 of which had a large number of missing cases[4].

Restriction (d): Finally, the study sample was further restricted to adolescents who had complete information on the friendship dimensions and the friends' STI/HIV risk behaviors for all their nominated friends who were included in the study. The computation of friends' STI/HIV risk behaviors was based on the STI/HIV risk behaviors of adolescents at Wave I. The large number of missing cases for the STI/HIV risk behaviors variable resulted in many missing cases for the friends' STI/HIV risk behavior variables. For the sample of 1,901 Black and White respondents, there were one hundred and thirty-two missing cases (7%) for friends' STI/HIV risk behaviors (for behavioral and emotional closeness, only one missing case was noted). Significant differences by gender were observed between respondents who had missing data on their friends' STI/HIV risk behaviors and those who did not have. About 60% of respondents with missing data on their friends were males compared to 47% of respondents with no missing data. Both groups did not differ by age or race.

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[4] The 18 questions used to compute the MSM variable were relationship-specific questions [sections 25 & 26], whereby respondents were asked to name a partner, and were then asked a series of questions about their relationship with this partner. Of particular interest to this study were the questions about the gender of each partner and whether they had sexual intercourse with him/her. These questions were used to create the MSM variable (along with the respondents' gender). According to the Add Health codebook documentation, the large number of missing values in those 6 questions (in section 26) are mostly because the respondent answered "refused", "don't know" or "not applicable" when asked for their partner's initials. It was due to a lesser extent to a programming error (Wave I in-Home Questionnaire Code Book – Introductory Guides).

Table IV.1 - Comparison of the schools in the saturation sample to the other schools in the Add Health sample, on the main sampling variables

	Saturation sample (n=16)		Other schools in Add Health (n=116)		Total schools in Add Health (n=132)	
	N	%	N	%	N	%
School size						
125 students or fewer	3	15.7	1	1.5	4	7.7
126 to 350 students	5	21.4	8	17.0	13	18.9
351 to 775 students	3	43.0	32	33.6	35	27.7
776 or more students	5	19.9	75	47.9	80	35.7,
School type*						
Public	11	73.1	110	95.4	121	85.6
Catholic	1	11.3	4	2.9	5	6.6
Private	4	15.6	2	1.7	6	7.8
Metropolitan location						
Urban	4	21.1	36	21.5	40	21.4
Suburban	7	59.5	66	61.7	73	60.7
Rural	5	19.4	14	16.8	19	17.9
Region						
West	4	18.0	24	12.5	28	14.9
Midwest	5	47.7	25	31.1	30	38.3
South	4	14.6	50	43.4	54	30.8
Northeast	3	19.7	17	13.0	20	16.0
Percentage White*						
0%	7	37.8	10	10.5	17	22.4
1-66%	1	0.3	42	30.7	43	17.5
67-93%;	3	18.6	40	31.5	43	25.9
94-100%	5	43.3	24	27.3	29	34.2

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

Figure IV-2 - Sample Selection for the Current Study

```
         ┌─────────────────────────┐
         │     In-home Wave I      │
         │      n = 20,745         │
         └─────────────────────────┘
                     │
                     ▼
         ┌─────────────────────────┐
         │   Saturation Sample     │
         │        Wave I           │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         │      n = 3,702          │- - - - -  Saturation Sample, only Wave I
         └─────────────────────────┘         │ n=743                      │
                     │                       └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                     ▼
         ┌─────────────────────────┐
         │   Saturation Sample     │
         │    Waves I and III      │
         │      n = 2,959          │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         └─────────────────────────┘         │ Missing information on      │
                     │- - - - - - - - - - - -  weights: n=25               │
                     ▼                       └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
         ┌─────────────────────────┐
         │  No missing information │
         │       on weights        │
         │      n = 2,934          │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         └─────────────────────────┘         │ Missing information on:     │
                     │- - - - - - - - - - - - │   -  Race:  n=98            │
                     ▼                       │   -  Ethnicity: n=5          │
         ┌─────────────────────────┐         └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
         │ No missing information  │
         │        on race          │
         │      n = 2,832          │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         └─────────────────────────┘         │ Other race/ethnicities      │
                     │- - - - - - - - - - - - │ (including Hispanics, Asians │
                     ▼                       │ and Native Americans):  n=931│
         ┌─────────────────────────┐         └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
         │ Black and White         │
         │    adolescents          │
         │      n = 1,901          │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         └─────────────────────────┘         │  Do not have any friends    │
                     │- - - - - - - - - - - - │ interviewed in the study: n=392│
                     ▼                       └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
         ┌─────────────────────────┐
         │ At least one friend     │
         │ interviewed in Add Health│
         │      n = 1,509          │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         └─────────────────────────┘         │ Missing information on       │
                     │- - - - - - - - - - - - │ STI/HIV risk behaviors in    │
                     ▼                       │ adolescence:  n=261          │
         ┌─────────────────────────┐         └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
         │ Valid measures for STI/HIV│
         │ risk behaviors in adolescence│
         │      n = 1,248          │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
         └─────────────────────────┘         │ No complete friendship       │
                     │- - - - - - - - - - - - │ information:  n=94           │
                     ▼                       └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
         ┌─────────────────────────┐
         │  Complete friendship    │
         │      information        │
         │      n = 1,154          │
         └─────────────────────────┘
```

IV.2. Measures

IV.2.1. Outcome Variable

STI/HIV risk behaviors in emerging adulthood (at Wave III).   This variable was created as a count based on the following sexual behavior and drug use questions measured at Wave III:

Sexual activity was measured by the question "Have you ever had vaginal intercourse (vaginal intercourse is when a man inserts his penis into a woman's vagina)?" Respondents who reported not being sexually active were given a score of 0 while those who reported being sexually active were given a score of 1.

Number of sexual partners was measured by the open-ended question "With how many different partners have you had vaginal intercourse in the past 12 months?" Responses ranged from 0 to 43. For the purpose of these analyses, this question was recoded as follows: 0 = Have not had sexual intercourse/0 sexual partners in the past 12 months; 1 = 1 sexual partner; and 2 = 2 or more sexual partners. Cut-off points were chosen based on conceptual and empirical considerations: not being sexually active or not having had sexual partners during the 12 months preceding the survey are associated with the lowest risk of STI/HIV transmission. It was therefore important to differentiate this group from the other respondents. Among respondents who reported having had sexual partners during the 12 months preceding the survey, the lower the number of sexual partners, the lower the risk of STI/HIV (assuming partners of similar risk). Since reporting only 1 sexual partner is the least risky behavior, and since almost 50% of the respondents reported this behavior, it was important to keep this category separate. Finally, respondents reporting 2 or more sexual partners are considered to be at the highest risk of STI/HIV transmission, as compared to the previous two categories. Almost one-third of respondents reported 2 or more sexual partners but almost 50% of those reported 2 partners. Given the small percentages for the higher categories of sexual partners, all categories including 2 sexual partners and beyond were grouped into one group.

Frequency of condom use was measured by the question "On how many of these occasions [frequency of vaginal intercourse in the past 12 months] did you/your partner use a condom?" This question was recoded for this analysis to reflect consistent condom use versus all other situations (0 = Never had sex; 1= all the time; 2 = None/Some/Half/Most of the time).

Sex for money was measured by the question "In the past 12 months, how many times have you had sex with someone who paid you to do so?" Response options were recoded to reflect '0' for 'None' and '2' for '1 or more times.' A score of 2 was assigned to the 'Yes' answer to avoid minimizing the contribution of this item to the scale (i.e., respondents reporting having had sex for drugs or money would be weighed equally to those reporting the highest risk category for condom use and number of sexual partners) .

Injection drug use was measured by the question "In the past year, have you injected an illegal drug?" Response options included '0' for 'No' and '2' for 'Yes.' A score of 2 was assigned to the 'Yes' category of this item to avoid minimizing the contribution of this item to the scale.

Men having sex with men (MSM) was created based on questions that assess respondents' romantic and non-romantic relationships. At Wave III, respondents were asked to list all romantic relationships they had since Summer 1995 [this is when Wave I data collection was drawing to an end] and specify: (1) whether the partner was male or female; and (2) whether they had sexual relations [vaginal, oral or anal] with this partner. Respondents listed up to 48 relationships. The variable MSM was created by combining the responses to options (1) and (2). Males who reported having had sexual relations with a male partner received a score of 2. All other options (male respondents reporting having female partners [whether they stated having sexual relations with them or not] or no partners; and female respondents) received a score of 0.

Responses to these 6 questions were summed to yield an STI/HIV risk behaviors scale. The scale could theoretically range from '0' to '11' for males and '0' to '9' for females (since the variable MSM does not apply to them), but in this sample, it ranged from '0' to '7,' with higher scores indicating greater involvement in STI/HIV risk behaviors. To determine the validity of the scale, the

47

mean number of STI/HIV risk behaviors was compared between respondents who tested positive on any STI and those who tested negative on all (see section I.3.4. 'Other Variables' for details about the computation of the STI test variable). The results indicate that the mean number of STI/HIV risk behaviors among respondents who were tested positive for any STI was significantly greater than the mean number of STI/HIV risk behaviors among respondents who tested negative on all three STIs (4.2 versus 3.2, p = 0.000).

IV.2.2. Explanatory Variables

Adolescents' STI/HIV risk behaviors (at Wave I). This variable was created as a count based on the following sexual behavior and drug use questions measured at Wave I:

Sexual activity was measured by the question "Have you ever had sexual intercourse? When we say sexual intercourse, we mean when a male inserts his penis into a female's vagina." However, some respondents who answered "no" to this question did report having sexual intercourse with their romantic or non-romantic partners. To address this issue, a new variable was created based on (1) the above question about sexual intercourse; and (2) reports of sexual activity with all romantic and non-romantic partners. Respondents who answered "no" to the above question and who did not report having had sexual intercourse with any of their romantic or non-romantic partners were given a score of 0; respondents who answered "no" to the above question but who reported having had sexual intercourse with their partners were given a score of 1; finally, respondents who answered "yes" to the above question were given a score of 1.

Number of sexual partners was computed based on several questions that inquired about the relationships of respondents. Adolescents were asked to list 3 romantic partners and indicate whether they engaged in sexual intercourse with them. They were also asked to indicate with how many other partners they have ever had sexual intercourse. The number of sexual partners was calculated by combining these questions. Responses ranged from 0 to 45. For the purpose of these analyses, this question was recoded as follows: 0 = Have not had sexual intercourse; 1 = 1 sexual partner; and 2 = 2

48

or more sexual partners. Cut-off points were chosen based on the same criteria used for defining the number of sexual partners at Wave III.

Frequency of condom use was computed based on the questions about condom use at first and most recent sexual intercourse (a question inquiring about frequency of condom use was available, but the majority of respondents were screened out of it). For first and most recent sex, respondents were asked to circle all methods of birth control used (condoms was one of the response options). Each question was then recoded to reflect respondents who used condoms and those who either used other birth control or did not use any. Finally, responses to both questions were combined such that respondents who reported using condoms at both first and most recent sex were considered to "use condoms all the time" while those who reported using condoms at either first or most sex, or at none of these occasions were grouped into a "sometime/never" category (0 = Never had sex; 1= Always; 2 = Sometime/Never).

Sex for money was measured by the question "Have you ever given someone sex in exchange for drugs or money?" Response options included '0' for 'No' and '2' for 'Yes.' A score of 2 was assigned to the 'Yes' answer to avoid minimizing the contribution of this item to the scale (i.e., respondents reporting having had sex for drugs or money would be weighed equally to those reporting the highest risk category for condom use and number of sexual partners) .

Injection drug use was measured by the question "During your life, have you ever injected (shot up with a needle) any illegal drug, such as heroin or cocaine?" Response options included '0' for 'No' and '2' for 'Yes.' A score of 2 was assigned to the 'Yes' category of this item to avoid minimizing the contribution of this item to the scale.

Men having sex with men (MSM) was created based on questions that assess respondents' romantic and non-romantic relationships. At Wave I, respondents were asked to list up to 3 romantic and up to 3 non-romantic relationships they had. For each relationship, the respondents specified: (1) whether the partner was male or female; and (2) whether they had sexual relations with this partner [this information was extracted from the "card game": respondents were asked to choose cards

corresponding to activities they engaged in during their relationship; sexual intercourse with their partners was one of the cards. If the card was chosen, it was an indication that the respondents engaged in sexual intercourse with their partner]. The variable MSM was created by combining the responses to options (1) and (2). Males who reported having had sexual relations with a male partner received a score of 2. All other options (male respondents reporting having female partners [whether they stated having sexual relations with them or not] or no partners; and female respondents) received a score of 0.

Responses to these 6 questions were summed to yield an STI/HIV risk behaviors scale. The scale could theoretically range from '0' to '11' for males and '0' to '9' for females (since the variable MSM does not apply to them), but in this sample, it ranged from '0' to '8,' with higher scores indicating greater involvement in STI/HIV risk behaviors.

Table IV.2 shows the frequency distribution of the variables used to create the STI/HIV risk behaviors in adolescence and emerging adulthood.

Table IV.2 Frequency distribution of the variables used to create the STI/HIV risk behaviors in emerging adulthood (Wave III) and adolescence (Wave I) – Percentages are weighted.

Measures at Wave I	Frequency		Measures at Wave III	Frequency	
	N	%		N	%
Sexual activity			*Sexual activity*		
No	777	76.9	No	165	14.11
Yes	377	23.1	Yes	982	85.89
Total	1154	*100.00*	*Total*	1147	*100.00*
Number of sexual partners (ever)			*Number of sexual partners during the 12 months preceding the survey*		
0 partners/never had sex	812	77.96	0 partners/never had sex	263	23.23
1 partner	151	9.04	1 partner	587	54.08
2 or more partners	191	12.99	2 or more partners	292	22.69
Total	1154	*100.00*	*Total*	1142	*100.00*
Frequency of condom use			*Frequency of condom use during the 12 months preceding the survey*		
Have never had sex	777	76.9	Never had sex/Never had sex in the past 12 months	263	23.21
Always used condoms	167	8.69	Always used condoms	205	16.41
Inconsistent/Never	210	14.41	Inconsistent/Never	675	60.38
Total	1154	*100.00*	*Total*	1143	*100.00*
Have ever had sex in exchange for drugs or money			*Have had sex in exchange for drugs or money during the past 12 months*		
No	1141	99.41	No	1147	99.68
Yes	13	0.59	Yes	6	0.32
Total	1154	*100.00*	*Total*	1153	*100.00*
Injection drug use (ever)			*Injection drug use during the 12 months preceding the survey*		
No	1153	99.99	No	1152	99.94
Yes	1	0.01	Yes	2	0.06
Total	1154	*100.00*	*Total*	1154	*100.00*
MSM			*MSM*		
No	1149	99.83	No	1146	99.33
Yes	5	0.17	Yes	8	0.67
Total	1154	*100.00*	*Total*	1154	*100.00*

Table IV.2 – Cont'd

Measures at Wave I	Frequency		Measures at Wave III	Frequency	
	N	**%**		**N**	**%**
STI/HIV risk behaviors			*STI/HIV risk behaviors*		
0	758	75.37	0	158	14.04
1	6	0.33	1	89	8.04
2	43	2.51	2	6	0.19
3	91	5.14	3	143	12.3
4	129	7.48	4	505	47.19
5	115	8.74	5	228	17.89
6	6	0.17	6	2	0.06
7	5	0.23	7	3	0.30
8	1	0.01			
Total	1154	*100.00*	*Total*	1134	*100.00*

Friendship quantity was computed from adolescents' listing of their best male (up to five) and best female (up to five) friends, obtained at Wave I. The friends listed could either be included in the Add Health survey or not (for respondents in the saturation sample, most of the nominated friends were also included in Add Health). For the purpose of these analyses, the total number of friends refers only to those friends included in the Add Health survey (for e.g., if a respondent had nominated 5 friends, but 3 of those were not included in the survey, the total number of friends for this respondent was 2). This variable was a count of the number of friends, which ranged from 0 to 10 (number of friends here refers to the number of nominated friends included in the Add Health). Only respondents with at least one friend included in the survey were eligible to be included in the study. This variable was measured on an interval scale.

Behavioral closeness to friends was created using adolescents' reports of their involvement with their nominated friends who were included in the Add Health survey (i.e., respondents' reports of involvement with nominated friends who were not in the survey were not used to compute the average behavioral closeness to friends). This variable was obtained from Wave I, and measured on an interval scale. A total score for behavioral closeness to each friend was based on the number of activities engaged in together over the past week. For each friend, adolescents reported whether, in the past week, they had gone to a friend's house, hung out with him or her after school, talked with him or her on the telephone, talked about a problem, and whether they spent time with this friend in the past week-end (1=yes, 0=no). Then the scores for each of the nominated friends were averaged to determine the behavioral closeness to friends. The score for *behavioral closeness to friends* ranged from '0' to '5.' The higher the score, the more behaviorally close the adolescents were to their friends, on average. To measure the internal consistency of the resulting scale, Cronbach's alpha was computed. Cronbach's alpha is traditionally used with items with non-dichotomous measures (DeVellis, 1991), but is also adequate for binary data. In fact, the Kuder-Richardson formula 20 (KR-20), generally used for binary data, is a special case of alpha (SAS, 2006). The higher the alpha (or

the KR-20), the more internally consistent the scale (for best male friend, α: 0.72; for best female friend, α: 0.73). Alpha generally ranges from 0 to 1 and should be at least 0.70 or higher for a scale to be considered adequate. The alpha values for this study indicate that the scale's internal consistency is adequate.

Emotional closeness to friends was computed from the reciprocated friendships, and measured on an interval scale. A friendship was considered to be reciprocated if both the adolescent and his friend nominated each other as friends. For each adolescent, a count of the number of reciprocated friendships was calculated. Then, the proportion of reciprocated friendships was computed by summing the number of reciprocated friendships for each respondent and dividing by the total number of friends included in the Add Health survey that the respondent nominated. The score ranged from 0 to 1. The higher the score, the more emotionally close the adolescents were to their friends.

Friends' STI/HIV risk behaviors (Wave I) indicate the friends' group involvement in STI/HIV risk behaviors. The STI/HIV risk behaviors for each nominated friend included in Add Health were computed in the same way as the baseline adolescents' STI/HIV risk behaviors (see corresponding paragraph above). The STI/HIV risk behaviors for each friend were then summed across all nominated friends and divided by the total number of friends with valid STI/HIV risk behaviors data to get the average STI/HIV risk behavior involvement for the friendship group. The score ranged from 0 to 8. Higher scores indicate that friends are engaged in more STI/HIV risk behaviors.

Respondents' *Race* at Wave I will be used for these analyses, and are based on respondents' self-reports. Adolescents were asked to indicate their race and were given the option to choose more than one racial group. Response options included White, African American, American Indian or Native American, and Asian or Pacific Islander. Respondents who chose more than one racial group were further asked "Which one category best describes your racial background?" The race variable was pre-constructed using these questions by the Add Health team, and made available for use to

54

researchers at the Carolina Population Center. The analysis for this study is restricted to non-Hispanic White and Black adolescents, with White adolescents used as the referent.

Respondents' *Gender* at Wave I will be used for these analyses. It is a self-reported dichotomous variable. The Add Health research team noted that, in some cases, the gender at Wave I was inaccurate (Add Health FAQ). To address this issue, the gender at Wave I has been confirmed by checking gender at Waves II and III. For all cases (only 3) where a discrepancy in gender existed between the 3 Waves, the measure at Waves II and III were concordant. Therefore, gender at Wave I was changed to match that of Wave III. Males were considered as the referent.

IV.2.3. Control Variables

Respondents' *Age* at baseline (Wave I) was calculated by subtracting the date of birth from the interview date.

The quality of respondents' relationship with parents (Wave I) was indicated by two items that assess the extent to which respondents feel close to their mother (or a mother figure such as stepmother or adoptive mother) and father (or a father figure such as stepfather or adoptive father). These items were measured on 5-point scales (0 = not at all; to 5 = very much). Items were then added together and averaged to yield a measure of the quality of respondents' relationship with parents. If the respondent did not report a mother or father figure, only information for the available parent was used. If the respondent did not report any parental figure, respondents received a score of 0 for this variable. Lastly, eleven respondents had replied "don't know" or "refused" to their relationship with their mother and father figures. To avoid losing these respondents from the data, they were also assigned a score of 0. The higher the score, the better the quality of the relationship (the score ranged from 0 to 5).

Respondents' *religiosity* (Wave I) was measured by one indicator obtained at baseline assessing respondents' frequency of attending religious services in the 12 months preceding the survey. This item has four response options (1 = never; to 4 = once a week or more).

Highest parental education was used as a proxy for respondents' SES (Wave I). Goodman's (1999) analysis of the relationship between SES indicators (parental education and occupation, and household income) and five adolescent health outcomes (depression, obesity, asthma, suicide attempt in the past year, and prior sexually transmitted disease) concluded that parental education and income were independent correlates of 2 of the 5 health outcomes whereas occupation was not associated with any of the outcomes. Parental education could therefore be considered as a good proxy for adolescent SES. For this study, parental education was indicated by the adolescents' reports of the highest educational level of their resident father or mother, and was categorized as follows: less than high-school (referent), high-school graduate/GED, some college, and college graduate or higher.

Respondents' involvement in a romantic relationship (Wave I) was constructed from several questions asked at different stages of the interview as follows. First, respondents were asked "In the last 18 months, have you had a special romantic relationship with anyone (0 = No; 1 = Yes) [Stage 1]. However, the Add Health research team noted that some respondents who answered "no" to the above question did list romantic partners when prompted to. Therefore the following 4 questions were further asked to all respondents who answered "no" to the question in stage 1: In the last 18 months, did you ever hold hands with someone who was not a member of your family? (0 = No; 1 = Yes); In the last 18 months, did you ever kiss someone on the mouth who was not a member of your family? (0 = No; 1 = Yes); In the last 18 months, did you ever tell someone who was not a member of your family that you liked or loved them? (0 = No; 1 = Yes); Did you do these things with the same person? (0 = No; 1 = Yes) [Stage 2]. Respondents who answered "yes" to the last question in stage 2 were considered to be involved in a romantic relationship. Finally, in stage 3, respondents were given the option to opt out of an involvement in a romantic relationship (after being assigned to a romantic relationship based on information in stage 2) by answering the following question: In what month [and year] did your relationship with [initials] begin? That is, when did you first consider [initials] a special friend? If you don't consider this person a special friend, enter "00" for both month and year (stage 3). Using the questions in the 3 stages, respondents were considered to be involved in a

romantic relationship if a): they answered "yes" to the question in stage 1; b) they answered "no" or "don't know" to the question in stage 1, but "yes" to the last question in stage 2 and did not specify "00" for the stage 3 question.

IV.2.4. Other Variables

Respondents' *STI test* was used to check for the validity of the STI/HIV risk behaviors measure at Wave III (see Analysis Plan for further information). This variable was created as a composite measure to identify respondents who tested positive to at least one of three STI infections (Chlamydia, gonorrhea and trichomoniasis) (coded as 1) or negative for all three (coded as 0). Respondents with missing data on any one test were not included in the composite variable.

Number of nominated friends not included in Add Health: Similarly to friendship quantity, this variable was computed from adolescents' listing of their best male (up to five) and best female (up to five) friends, obtained at Wave I. However, unlike the friendship quantity variable, this variable only included the nominated friends who were not included in the Add Health survey. This variable also ranged from 0 to 10 and was measured on an interval scale.

Total number of friends was computed as the sum of the friendship quantity (number of friends included in Add Health) and number of nominated friends not included in Add Health. It ranged from 0 to 10 and was measured on an interval scale.

Difference between in-study and out-of-study friends was computed as the number of nominated friends who were included in Add Health minus the number of friends who were not included in Add Health. This variable ranged from -10 to +10. It was then recoded into 3 groups (0 = number of in-study friends is equal to the number of out-of-study friends; 1 = number of in-study friends is less than the number of out-of-study friends; and 2 = number of in-study friends is greater than the number of out-of-study friends).

IV.3. Analysis Plan

The analysis was performed in stages, using Stata 9.0 (StataCorp, 2005) since this software is ideally suited for handling Add Health's complex sampling design. This section describes the construction of the dataset encompassing all the necessary variables; presents the strategy used to account for Add Health's complex design; explores the extent of the missing data; describes the preliminary analyses; and finally presents the statistical tests used to examine each of this study's aims.

IV.3.1. Construction of the Dataset

The variables needed for these analyses are located in different datasets that were merged together. In addition to the data files that derive directly from the study questionnaires (e.g. in-home data files for Wave I), several additional data sets were created by the Add Health research team, based on these files, to assist researchers in the use of the data. A total of 7 datasets (the original Waves I and III; and the rest are constructed datasets that contain variables of interest) were merged to create the final dataset needed for the analyses. Merging was performed in stages, using STATA 9.0 (StataCorp, 2005).

IV.3.2. Sampling Weights and Accounting for Clustering Effects

For all the analyses, I corrected for Add Health's design effect and accounted for the clustering of adolescents within schools to ensure that the findings have unbiased estimates of variance and standard errors (Chantala, 2003; Chantala & Tabor, 1999). The intricate design is a consequence of using schools as the primary sampling units, therefore resulting in respondents being clustered, and the observations being no longer independent. The Add Health research team has issued several publications to guide researchers to best achieve this result (Chantala, 2003; Chantala & Tabor, 1999; Tourangeau & Shin, 1999). I used sampling weights in all analyses, as well as appropriate sampling design characteristics (such as specifying the cluster and strata variables). I used these weights from Wave III since, when using combined datasets, the Add Health research team

recommends using the weights from the most recent Wave of data collected (Chantala & Tabor, 1999).

Stata (StataCorp, 2005) is the software of choice for performing these analyses, as it has a built-in capacity to accommodate complex designs, provided the correct design variables are entered into the program. For these analyses, the three design variables that were specified were *region* (post-stratification variable), *cluster* (the primary sampling unit in the study, i.e., the schools), and *weight* (correction for obtaining unbiased estimates of population parameters). I used Stata's *Taylor series survey estimation* (the 'svy' commands) during the analyses to control for the design effects.

IV.3.3. Missing Data

Longitudinal research through childhood, adolescence and young adulthood presents particular challenges, including dealing with a potentially high number of missing values (Faden et al., 2004). Although Add Health's "Wave III sample adequately represents the same population as the Wave I sample when final sampling weights are used to compute population estimates" (Chantala et al., 2004), there was a need to document the extent of missing data in the analytical sample. Missing data were defined as the cases with values missing on the study's explanatory variables. The cases excluded based on the study's eligibility criteria were not considered as missing data (they would rather account for a selection bias). The extent of missing data was first assessed by conducting univariate analyses on the variables of interest (friendship quantity, closeness to friends, friends' STI/HIV risk behaviors, age, gender and race) and then by determining whether the missing values were randomly distributed across all observations. To determine whether cases were missing completely at random, the sample was divided into those with and without any missing data on the variable of interest. Interval variables (e.g., STI/HIV risk behaviors in adolescence) were recoded into a new variable with a code of '0' when the case was missing and '1' when it was not. Both groups were then compared using either a t-test of mean difference or a chi-square test (depending on whether the other variable was continuous or categorical). Failure to observe significant differences

between the two groups at the 95% confidence level ensures that missing data are randomly distributed across observations. In this situation, missing data were handled using listwise deletion of cases. Observation of significant differences between the samples with and without missing values suggests that missing cases are not randomly distributed across populations, and could be due to the large sample size. When the sample size is large, even small differences between the two samples could turn out to be statistically significant. Therefore, careful consideration of the resulting differences between the two groups will be given, prior to deciding on how to handle the missing data (D. Garson, 2005).   As discussed in a previous section (section IV.1.3.1), missing values for STI/HIV risk behaviors at Wave I were not missing at random (non-selected cases were more likely to be male, Black and older). The study sample was therefore restricted to respondents who had valid data on this variable.

IV.3.4. Preliminary Analyses

An initial step in the analyses was to check for any inconsistencies and outliers in the items used to construct the variables needed for these analyses. I checked the data for any inconsistencies by using univariate descriptive statistics including frequencies, means, and measures of dispersion. I then computed tests for skewness and kurtosis to check that the variables' distribution approximates a normal one. I then computed Pearson's correlations, adjusted for study design, between the predictors to check for any collinearity.

IV.3.5. Hypotheses Testing

IV.3.5.1. Analyses for Aim I

Aim I: *To examine the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood, and investigate gender and racial differences in this relationship.*

RQ1.   *What is the relationship between STI/HIV risk behaviors in adolescence (Wave I) and those in emerging adulthood (Wave III)?*

RQ2.   *Does the relationship between STI/HIV risk behaviors in adolescence (Wave I) and those in emerging adulthood (Wave III) vary by gender, and race?*

Research questions 1 and 2 were addressed using simple and multiple linear regression models. Linear Regression is a statistical technique used to predict the variance in an interval dependent variable, based on linear combinations of interval, dichotomous or dummy independent variables (or just one of those variables in the case of a simple regression) (D Garson, 2006; Kleinbaum et al., 1998). For this aim, the interval outcome variable, STI/HIV risk behaviors in emerging adulthood (measured at Wave III), ranged from a low of 0 to a high of 7.

Multiple linear regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (through a significance test for R^2), and the relative contribution of the independent variables to the outcome (by comparing regression coefficients) (D Garson, 2006). The analysis was conducted in two steps: First, the moderation models including the interactions between gender and race with STI/HIV risk behaviors in adolescence were estimated. Second, main effects of the predictors were investigated.

The regression equation used for RQ1 and RQ2 was of the general form:

$$Y = \Sigma b_i * x_i + \Sigma d_i * z_i + c + e$$

Where:
Y = STI/HIV risk behaviors in emerging adulthood (Wave III)
b_i = regression coefficients for the covariates x_i
x_i = covariates, which include for RQ1: STI/HIV risk behaviors in adolescence (Wave I); and for RQ2: STI/HIV risk behaviors in adolescence, in addition to variables representing gender, race and the interaction of gender and race, with STI/HIV risk behaviors in adolescence.
b_i = regression coefficients for the control variables z_i
z_i = control variables, which include for respondents' age, quality of relationship with parents, involvement in a romantic relationship, frequency of attendance of religious services and highest level of parental education, all measured at Wave I.
c = the intercept. It is the estimated value of Y when all the independents have a value of 0.
e = error term

Specifically, the equations that were estimated are:
For RQ1:
$RB_{\text{emerging adulthood}} = b_0 + b_1 * RB_{\text{adolescence}} + c + e$

For RQ2:
$RB_{\text{emerging adulthood}} = b_1(RB_{\text{adolescence}}) + b_2(\text{Gender}) + b_3(\text{Race}) + b_4(RB_{\text{adolescence}} * \text{Gender}) + b_5(RB_{\text{adolescence}} * \text{Race}) + \text{Controls} + c + e$

Note: RB$_{emerging\ adulthood}$ = STI/HIV risk behavior in emerging adulthood (Wave III)
RB$_{adolescence}$ = STI/HIV risk behavior in adolescents (Wave I)

Significant two-way interactions, at the 95% confidence level, between gender or race and STI/HIV risk behaviors in adolescence would indicate gender or race differences in the relationship between STI/HIV risk behaviors in adolescence and emerging adulthood. If the interaction terms (*RB$_{adolescence}$*Gender*, and *RB$_{adolescence}$*Race*) were significant at the 95% confidence interval, further models were run separately for each gender and/or racial group (Frazier et al., 2004). The hypotheses will be supported as follows: Hypothesis H2.1 will be accepted if the b coefficient of RB$_{adolescence}$ for males is larger than that for females (steeper slope when plotting the graph based on the model, or statistically comparing the coefficients across groups to test if the slopes are significantly different). Hypothesis H2.2 will be accepted if the b coefficient of RB$_{adolescence}$ for Black adolescents is larger than that for White adolescents (again, the slope is steeper when plotting the graph or the coefficients across groups are statistically different). If the interaction terms are not significant, they will be removed from the model to examine the main effect of STI/HIV risk behaviors in adolescence: a positive b coefficient for *RB$_{adolescence}$* will indicate support for Hypothesis H1.1.

IV.3.5.2. Analyses for Aim II

Aim II: *To examine the association between adolescents' STI/HIV risk behaviors and three friendship dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk behaviors; and to determine whether the association varies by gender and race.*

RQ3. *Are STI/HIV risk behaviors in adolescence associated with number of friends, emotional and behavioral closeness to friends, and friends STI/HIV risk behaviors?*

RQ4. *Does the association between STI/HIV risk behaviors in adolescence and number of friends, emotional and behavioral closeness to friends, and friends STI/HIV risk behaviors vary by gender and race?*

Multiple linear regression were used to test these hypotheses, and the analysis was again performed in two steps: First investigation of the interaction effects between each friendship and friend variable with gender and race was conducted. Second, either probing of a significant

interaction term or examination of the main effects were performed, depending on whether the interactions were significant. Details on the analysis strategy are as follows:

Step 1: The models used to test the gender and race moderation effects included STI/HIV risk behaviors in adolescence as the outcome, one of the friendship dimensions (number of friends, emotional or behavioral closeness to friends, friends' STI/HIV risk behaviors), gender and race, and the interaction between friendship dimensions and gender or race as the predictors. The models are:

$$RB_{adolescence} = b_1(\#\_friends) + b_2(Gender) + b_3(Race) + b_4(\#\_friends*Gender) + b_5(\#\_friends*Race) + Controls + c + e$$

$$RB_{adolescence} = b_1(Em\_Close) + b_2(Gender) + b_3(Race) + b_4(Em\_Close*Gender) + b_5(Em\_Close*Race) + Controls + c + e$$

$$RB_{adolescence} = b_1(Be\_Close) + b_2(Gender) + b_3(Race) + b_4(Be\_Close*Gender) + b_5(Be\_Close*Race) + Controls + c + e$$

$$RB_{adolescence} = b_1(friends\_RB) + b_2(Gender) + b_3(Race) + b_4(friends\_RB*Gender) + b_5(friends\_RB*Race) + Controls + c + e$$

Where:

$RB_{adolescence}$	= STI/HIV risk behavior in adolescents (Wave I)
$\#\_friends$	= Number of friends; continuous (Wave I)
Em_Close	= Emotional closeness to friends (Wave I)
Be_Close	= Behavioral closeness to friends (Wave I)
$friends\_RB$	= Friends' STI/HIV risk behaviors (Wave I)

Coefficients were considered significant at the 95% confidence interval. If the interaction terms were significant at the 95% confidence interval, further models were run separately for each gender and racial group. The hypotheses will be supported as follows: Hypotheses H4.1, H4.2, H4.3 will be accepted if the b coefficients for the interaction terms are not significant, thereby indicating that the friendship dimensions do not differ by gender or race for different levels of involvement in STI/HIV risk behaviors.

Step 2: Non-significant interactions were dropped from the model to examine the main effect of each friendship variable on STI/HIV risk behaviors in adolescence. Coefficients were considered significant at the 95% confidence interval. Hypotheses H3.1 – 3.2 will be supported if the different

63

STI/HIV risk behaviors do not differ on number of friends and closeness to friends, meaning that the b coefficients are not significant. Hypothesis H3.3 will be supported if the b coefficient for friends' STI/HIV risk behaviors is positive and significant at the 95% confidence interval.

RQ5. *Are the three friendship dimensions (number of friends, emotional and behavioral closeness to friends, and friends STI/HIV risk behaviors) associated with race and gender?*

Multiple linear regressions were used to test whether number of friends, emotional and behavioral closeness to friends and friends' STI/HIV risk behaviors differed by gender and race. Separate models were fitted for each friendship variable including both gender and race as the predictors. The models were as follows:

$\#\_friends = b_1(Gender) + b_2(Race/Ethn) + c + e$

$Em\_Close = b_1(Gender) + b_2(Race/Ethn) + c + e$

$Be\_Close = b_1(Gender) + b_2(Race/Ethn) + c + e$

$friends\_RB = b_1(Gender) + b_2(Race/Ethn) + c + e$

Hypotheses H5.1, H5.2, H5.5, and H5.6 will be accepted if the b coefficients for gender or race are significant at the 95% confidence interval and the associations follow the hypothesized direction. Hypotheses H5.3, H5.4, and H5.7 will be supported if the friendship variables do not differ on gender or race, meaning that the b coefficients are not significant at the 95% confidence interval.

IV.3.5.3. Analyses for Aim III

Aim III: *To examine the effects of interactions among friendship dimensions in adolescence on emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk behaviors; and investigate gender and racial differences in these associations.*

RQ6. *Do friends' STI/HIV risk behaviors moderate the relationship between the number of friends the adolescents have and their STI/HIV risk behaviors in emerging adulthood (Wave III)?*

RQ7. *Do friends' STI/HIV risk behaviors moderate the relationship between adolescents' emotional and behavioral closeness to their friends and their STI/HIV risk behaviors in emerging adulthood (Wave III)?*

RQ8.   *Do the moderation models tested in Research Questions 6 & 7 vary by gender and race?*

Multiple linear regressions were used to test the hypotheses relative to each research question and the analysis was performed in two stages: In phase I, the moderation effects by gender and race were examined. If gender or race did act as moderators, then phase II will be performed separately for each gender and/or racial ethnic group (RQ8). Phase II involved the examination of the interaction between number of friends, closeness to friends and friends' STI/HIV risk behaviors (addressing RQ6 & 7). Details relative to these analyses are as follows:

Phase I: Examining moderation effects by gender and race (RQ8)

The outcome variable for the analyses for aim III is STI/HIV risk behaviors in emerging adulthood, and is an interval variable that ranges from a low of 0 to a high of 7. To test hypothesis H8.1, I fitted a linear regression model with STI/HIV risk behaviors in emerging adulthood as the outcome variable, and including (1) STI/HIV risk behaviors in adolescence, number of friends, behavioral and emotional closeness to friends, friends STI/HIV risk behaviors, gender; (2) two-way interaction terms between friends' STI/HIV risk behaviors and each of number of friends, behavioral and emotional closeness to friends; (3) two-way interaction terms between gender and each of the friendship dimensions, (4) three-way interaction terms between gender, friends' STI/HIV risk behaviors and either number of friends, behavioral or emotional closeness to friends; and (5) control variables. A similar model was fitted with race instead of gender to test hypothesis H8.2.

Coefficients will be considered significant at the 95% confidence interval. Non-significant three-way interactions will suggest that gender and/or race do not moderate the relationship between friendship dimensions and friends' STI/HIV risk profile (thus supporting hypotheses H8.1 & H8.2). The product term will be dropped from the model to allow for the assessment of the predictors' main effects. Significant three-way interactions will indicate a moderating effect of gender or race. In this situation, the sample will be stratified by gender or race and the models will be tested separately (i.e. phase II) for each gender or racial group. The models are:

$$RB_{adulthood} = b_1(Be\_Close) + b_2(Em\_Close) + b_3(\#\_friends) + b_4(friends\_RB) + b_5(Gender) +$$
$$b_6(Be\_Close*friends\_RB) + b_7(Em\_Close*friends\_RB) + b_8(\#\_friends* friends\_RB) +$$
$$b_9(Be\_Close*Gender) + b_{10}(EM\_Close*Gender) + b_{11}(friends\_RB *Gender) + b_{12}(\#\_friends$$
$$*Gender) + b_{13}(\#\_friends * friends\_RB * Gender) + b_{14}(Be\_Close * friends\_RB * Gender) +$$
$$b_{15}(Em\_Close * friends\_RB * Gender) + b_{16}(race) + b_{17}(RB_{adoles}) + Controls + c + e$$

$$RB_{adulthood} = b_1(Be\_Close) + b_2(Em\_Close) + b_3(\#\_friends) + b_4(friends\_RB) + b_5(Race/Ethn) +$$
$$b_6(Be\_Close*friends\_RB) + b_7(Em\_Close*friends\_RB) + b_8(\#\_friends* friends\_RB) +$$
$$b_9(Be\_Close*Race/Ethn) + b_{10}(EM\_Close* Race/Ethn) + b_{11}(friends\_RB * Race/Ethn) +$$
$$b_{12}(\#\_friends * Race/Ethn) + b_{13}(\#\_friends * friends\_RB * Race/Ethn) + b_{14}(Be\_Close *$$
$$friends\_RB * Race/Ethn) + b_{15}(Em\_Close * friends\_RB * Race/Ethn) + b_{16}(Gender) +$$
$$b_{17}(RB_{adoles}) + Controls + c + e$$

Phase II: Examining interactions between number of friends, closeness to friends and friends' STI/HIV risk behaviors

If moderating effects by gender or race are noted (i.e. hypotheses H8.1 and H8.2 are not supported), then this subsequent analysis will be conducted separately for each gender and/or racial group. If no gender or racial moderation effects are detected, the three-way interactions will be dropped from the model to test the interaction between friends' STI/HIV risk behaviors, number of friends, emotional and behavioral closeness to friends.

To test the interaction between friends' STI/HIV risk behaviors, number of friends, emotional and behavioral closeness to friends (hypotheses H6.1, H7.1 and H7.2), multiple linear regression models will be fitted that include: (1) STI/HIV risk behaviors in adolescence, number of friends, behavioral and emotional closeness to friends, friends STI/HIV risk behaviors, gender; (2) two-way interaction terms between friends' STI/HIV risk behaviors and each of number of friends, behavioral and emotional closeness to friends; and (5) control variables.

Coefficients will be considered significant at the 95% confidence interval. Significant two-way interactions between friends' STI/HIV risk behaviors and friendship quality, emotional or behavioral closeness to friends will indicate the presence of a moderation effect. In the situation where a moderation effect is detected, the interaction term will be preserved in the final model. Further models will then be run at specified levels of the moderator (friends' STI/HIV risk behaviors), such as using the mean or the mean ±1 standard deviation. The hypotheses will be

accepted as follows: Number of friends, behavioral or emotional closeness to friends should be associated with higher STI/HIV risk behaviors in emerging adulthood as the values of friends' STI/HIV risk behaviors increase (Hypotheses H6.1, H7.1 and H7.2 respectively). Should the interactions fail to be statistically significant, the product term will be removed from the model to assess the individual main effect of each friendship variable on the outcome.

V. Results

This chapter includes the results of my dissertation research. First, I present findings from preliminary analyses, including selection bias, demographic characteristics, univariate and bivariate statistics for the main study variables. Second, I present the results of the hypotheses testing relative to each of the study's aims. All percentages that are presented are weighted.

V.1. Preliminary Analyses

V.1.1. Comparison of the selected and non-selected samples: general considerations

Table V.1 shows a comparison on key study variables between (1) the final analytical sample used to test the study hypotheses (selected sample; n=1,154); (2) the cases that were dropped out of the study based on the restriction criteria (not selected sample; n=747), and (3) the sample that would have resulted by combining the selected and non-selected samples (i.e. the sample that could have been used to test the study hypotheses if I did not restrict the sample to adolescents who nominated at least one friend in Add Health, and to those who did not have missing information for STI/HIV risk behaviors in adolescence) (n=1,901). The variables used for the comparison were: control variables (age, involvement in a romantic relationship, quality of relationship with parents, highest parental education, and frequency of attendance of religious services); moderators (gender and race); a measure of risk behavior (STI/HIV risk behaviors in emerging adulthood) and a measure of friendship (total number of nominated friends).

Results showed that there were no significant differences between the analytical sample and the cases that were excluded from the analysis on any of the control variables (age, involvement in a romantic relationship, quality of relationship with parents, highest parental education, and frequency of attendance of religious services). However, samples differed on gender and racial composition: the

non-selected sample included more males (62.37%) than the selected sample (39.32%), as well as a higher percent of Black adolescents (12.07% compared to 5.69% in the selected sample). The gender difference is expected since, as mentioned previously, most of the cases missing the value for STI/HIV risk behaviors in adolescence were males who did not report whether or not they engaged in MSM.

To compare both the selected and non-selected samples on a measure of risk behavior, the mean number of STI/HIV risk behaviors in emerging adulthood was calculated for both. No significant differences were noted between both samples: the mean number of STI/HIV risk behaviors in emerging adulthood for the analytical sample was 3.26, whereas that for the non-selected cases was 3.52.

Finally, the analytical and non-selected samples were compared on the total number of nominated friends i.e., the sum of the number of nominated friends included in Add Health and the number of nominated friends who were not included. Results showed that both samples differed on this measure: The cases that were excluded from the analysis had nominated significantly fewer friends than those who were included (3.36 vs. 5.96 respectively; the range was from 1 to 10 friends).

Table V.1 - Frequency distribution and means of key study variables (controls, moderators, risk behavior and friendship) for the selected study sample, the non-selected sample, and the combination of both[1,2].

	Selected sample n=1154 (%)	Non-selected sample n=743 (%)	Both samples combined n=1901 (%)
_Gender (Wave I)_*			
Male	463 (39.32)	461 (62.37)	924 (48.23)
Female	691 (60.68)	286 (37.63)	977 (51.77)
Total	_1154 (100.00)_	_747 (100.00)_	_1901 (100.00)_
Race (Wave I)*			
Non-Hispanic Whites	952 (94.32)	503 (87.93)	1455 (91.85)
Non-Hispanic Blacks	202 (5.69)	244 (12.07)	446 (8.15)
Total	_1154 (100.00)_	_747 (100.00)_	_1901 (100.00)_
Involvement in a romantic relationship (Wave I)			
No	436 (42.13)	210 (35.49)	646 (39.56)
Yes	718 (57.87)	537 (64.51)	1255 (60.44)
Total	_1154 (100.00)_	_747 (100.00)_	_1901 (100.00)_
Frequency of attendance of religious services (Wave I)			
Never/doesn't identify with a religion	274 (19.83)	187 (23.86)	461 (21.37)
Less than once a month	209 (15.09)	107 (15.70)	316 (15.29)
Once a month or more, but less than once a week	182 (16.50)	134 (18.73)	316 (17.35)
Once a week or more	489 (48.62)	315 (41.72)	804 (45.98)
Total	_1154 (100.00)_	_743 (100.00)_	_1897 (100.00)_
Highest parental education (Wave I)			
Less than high school	52 (4.15)	54 (5.87)	106 (4.8)
Completed high school or GED	388 (36.36)	249 (37.73)	637 (36.88)
Some college	269 (21.53)	186 (26.77)	455 (23.52)
College graduate or higher	419 (37.96)	232 (29.64)	651 (34.81)
Total	_1128 (100.00)_	_721 (100.00)_	_1849 (100.00)_

Table V.I – Cont'd

	Selected sample n=1154 (%)	Non-selected sample n=743 (%)	Both samples combined n=1901 (%)
Quality of relationship with parents:			
Closeness to parents (Wave I)			
Mean	4.45	4.35	4.41
Total	*1154 (100.00)*	*747 (100.00)*	*1901 (100.00)*
Age (Wave I)			
Mean	15.69	15.89	15.77
Total	*1154 (100.00)*	*747 (100.00)*	*1901 (100.00)*
Total **number of nominated friends *****			
Mean	5.96	3.36	4.95
Total	*1154 (100.00)*	*747 (100.00)*	*1901 (100.00)*
STI/HIV risk behaviors in emerging adulthood (Wave III)			
Mean	3.26	3.52	3.35
Total	*1134 (100.00)*	*721 (100.00)*	*1855 (100.00)*

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

[1]Selected sample= the final analytical sample used to test the study hypotheses

Non-selected sample= the cases that were dropped out of the study based on the restriction criteria

Both samples combined= the sample that would have resulted by combining the selected and non-selected samples,

[2] Difference between the "n" for the individual variables and the overall "n" for each column is due to missing cases

V.1.2. Comparison of the selected and non-selected samples: gender differences

A comparison of the analytical and non-selected sample was then performed separately by gender, given the significant gender difference between these two samples.

V.1.2.1. Comparison of males who were selected vs. males who were not

Table V.2 shows a comparison on the main study variables between males in the final analytical sample used to test the study hypotheses (selected sample; n=463) and males who were excluded from the analysis (n=461). The variables used for the comparison were: control variables (age, involvement in a romantic relationship, quality of relationship with parents, highest parental education, and frequency of attendance of religious services); moderator (race); a measure of risk behavior (STI/HIV risk behaviors in emerging adulthood) and a measure of friendship (total number of nominated friends).

Results showed that males who were excluded from the analysis because of the study's exclusion criteria differed from those included in the study on only 2 of the 5 control variables: involvement in a romantic relationship and the quality of the relationship with parents. More males who were excluded from the study were involved in a romantic relationship (66% vs. 53% for males in the study) and reported less closeness to their parents (mean closeness to parents for the non-selected males was 4.38; for selected males it was 4.63). More males who were excluded from the study were Black (10.67% vs. 5.14% Blacks who were included).

Males who were included in the study and those who were excluded did not differ on the measure of STI/HIV risk behaviors in emerging adulthood (mean number of STI/HIV risk behaviors for males in the study was 3.31; it was 3.54 for males who were not in the study). Both groups of males differed with respect to the total number of nominated friends, with males in the study nominating significantly more friends than those excluded from the study (means: 5.79 vs. 3.56 respectively).

72

Table V.2 – Comparison of *males* who were selected and those who were not selected in the study, on key variables (controls, race, risk behavior and friendship) – Frequency distribution and means.

	Selected sample n=463 (%)	Non-selected sample n=461 (%)	Both samples combined n=924 (%)
Race (Wave I)*			
Non-Hispanic Whites	402 (94.86)	307 (89.33)	709 (92.1)
Non-Hispanic Blacks	61 (5.14)	154 (10.67)	215 (7.9)
Total	*463 (100.00)*	*461 (100.00)*	*924 (100.00)*
Involvement in a romantic relationship (Wave I)*			
No	208 (47.41)	115 (33.83)	323 (40.62)
Yes	255 (52.59)	346 (66.17)	601 (59.38)
Total	*463 (100.00)*	*461 (100.00)*	*924 (100.00)*
Frequency of attendance of religious services (Wave I)			
Never/doesn't identify with a religion	111 (17.02)	127 (27.89)	238 (22.42)
Less than once a month	77 (14.15)	70 (16.48)	147 (15.31)
Once a month or more, but less than once a week	77 (19.54)	77 (14.22)	154 (16.90)
Once a week or more	198 (49.3)	185 (41.40)	383 (45.37)
Total	*463 (100.00)*	*461 (100.00)*	*924 (100.00)*
Highest parental education (Wave I)			
Less than high school	10 (2.08)	29 (5.43)	39 (3.71)
Completed high school or GED	170 (39.14)	149 (36.54)	319 (37.87)
Some college	100 (20.89)	113 (27.89)	213 (24.3)
College graduate or higher	176 (37.9)	153 (30.14)	329 (34.11)
Total	*456 (100.00)*	*444 (100.00)*	*900 (100.00)*
Quality of relationship with parents: Closeness to parents (Wave I)*			
Mean	4.63	4.38	4.50
Total	*463 (100.00)*	*461 (100.00)*	*924 (100.00)*
Age (Wave I)			
Mean	15.73	15.98	15.86
Total	*463 (100.00)*	*461 (100.00)*	*924 (100.00)*
STI/HIV risk behaviors in emerging adulthood (Wave III)			
Mean	3.31	3.54	3.43
Total	*454 (100.00)*	*446 (100.00)*	*900 (100.00)*

Table V.2 – Cont'd

	Selected sample n=463 (%)	Non-selected sample n=461 (%)	Both samples combined n=924 (%)
Total number of nominated friends (in-study + out-of-study)***			
Mean	5.79	3.56	4.68
Total	*463 (100.00)*	*461(100.00)*	*924 (100.00)*

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

V.1.2.2. Comparison of females who were selected vs. females who were not

Table V.3 shows a comparison on the main study variables between females in the final analytical sample used to test the study hypotheses (selected sample; n=691) and females who were excluded from the analysis (n=286). The variables used for the comparison were: control variables (age, involvement in a romantic relationship, quality of relationship with parents, highest parental education, and frequency of attendance of religious services); moderator (race); a measure of risk behavior (STI/HIV risk behaviors in emerging adulthood) and a measure of friendship (total number of nominated friends).

Results showed that females who were excluded from the analysis because of the study's exclusion criteria did not differ from those included in the study on any of the control variables or on the risk behavior measure (mean number of STI/HIV risk behaviors in emerging adulthood for females who were excluded from the study was 3.46; the mean number was 3.22 for females included in the study).

Differences were observed between females who were excluded from the study and those who were included regarding race and the total number of friends. More Black females were excluded from the study as compared to White females and females who were included in the study had significantly more friends than those who were excluded (mean number of friends for females who were included in the study was 6; the mean was 3 for females who were excluded).

Table V.4 shows a summary of the comparative analysis between the cases excluded from the study and those included, in general and for each gender.

Table V.3 – Comparison of *females* who were selected and those who were not selected in the study, on key variables (controls, race, risk behavior and friendship) – Frequency distribution and means.

	Selected sample n=691 (%)	Non-selected sample n=286 (%)	Both samples combined n=977 (%)
Race (Wave I)*			
Non-Hispanic Whites	550 (93.96)	196 (85.6)	746 (91.61)
Non-Hispanic Blacks	441 (6.04)	90 (14.40)	231 (8.34)
Total	*691 (100.00)*	*286 (100.00)*	*977 (100.00)*
Involvement in a romantic relationship (Wave I)			
No	228 (38.71)	95 (38.26)	323 (38.58)
Yes	463 (61.29)	191 (61.74)	654 (61.42)
Total	*691 (100.00)*	*286 (100.00)*	*924 (100.00)*
Frequency of attendance of religious services (Wave I)			
Never/doesn't identify with a religion	163 (21.66)	60 (17.11)	233 (20.40)
Less than once a month	132 (15.62)	37 (14.38)	169 (15.28)
Once a month or more, but less than once a week	105 (14.53)	57 (26.27)	162 (17.78)
Once a week or more	291 (48.19)	130 (42.25)	421 (46.54)
Total	*691 (100.00)*	*284 (100.00)*	*975 (100.00)*
Highest parental education (Wave I)			
Less than high school	42 (5.50)	25 (6.55)	67 (5.79)
Completed high school or GED	218 (34.55)	100 (39.62)	318 (35.97)
Some college	169 (21.95)	73 (24.98)	242 (22.8)
College graduate or higher	243 (38.01)	79 (28.85)	322 (35.44)
Total	*672 (100.00)*	*277 (100.00)*	*949 (100.00)*
Quality of relationship with parents: Closeness to parents (Wave I)			
Mean	4.32	4.29	4.32
Total	691(100.00)	*286 (100.00)*	*977 (100.00)*
Age (Wave I)			
Mean	15.66	15.74	15.69
Total	691(100.00)	*286 (100.00)*	*977 (100.00)*
STI/HIV risk behaviors, emerging adulthood (Wave III)			
Mean	3.22	3.46	3.29
Total	*680 (100.00)*	*275 (100.00)*	*955 (100.00)*
<u>**Total** number of nominated friends (in-study + out-of-study)*****</u>			
Mean	6.06	3.03	5.21
Total	*691 (100.00)*	*286 (100.00)*	*977 (100.00)*

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

Table V.4 - Summary table showing differences between the analytical and non-selected samples on key variables, for males, females and the total sample (spaces left blank indicate that no significant differences were observed).

	Males		Females		Total	
	Selected sample	Non-selected sample	Selected sample	Non-selected sample	Selected sample	Non-selected sample
Gender (Wave I)						↑Males
Race (Wave I)		↑Blacks		↑Blacks		↑Blacks
Involvement in a romantic relationship (Wave I)		↑Yes				
Frequency of attendance of religious services (Wave I)						
Highest parental education (Wave I)						
Quality of relationship with parents: Closeness to parents (Wave I)		↓closeness				
Age (Wave I)						
STI/HIV risk behaviors in emerging adulthood (Wave III)						
Total number of nominated friends (in-study + out-of-study)		↓friends		↓friends		↓friends

V.1.3. Univariate analysis: Demographic characteristics and control variables

Table V.5 lists the demographic characteristics of the study sample, as well as the distribution of the control variables. Study participants included 1,154 students, of whom 691 were females (60.7%) and 463 were boys (39.3%). At Wave I, the sample ranged in age from 12.6 to 20.0 years with a mean age of 15.7 years. The majority of the participants were non-Hispanic White (94.0%), with the rest being classified as non-Hispanic Blacks (6.0%).

More than half of the respondents were involved in a romantic relationship at baseline (57.9%) and almost half reported attending religious services once a week or more (49.0%). Close to 60% of respondents had at least one parent with some college education or beyond. Respondents reported a mean of 4.45 for their closeness to their parents (scores ranged from 1 to 7).

Table V.5 - Frequency distribution of the sociodemographic and control variables

Measure	Frequency	
	N	**%**
Gender (Wave I)		
Male	463	39.32
Female	691	60.68
Total	*1154*	*100.00*
Race (Wave I)		
Non-Hispanic Whites	952	94.32
Non-Hispanic Blacks	202	5.69
Total	*1154*	*100.0*
Involvement in a romantic relationship (Wave I)		
No	436	42.13
Yes	718	57.87
Total	*1154*	*100.00*
Frequency of attendance of religious services (Wave I)		
Never/doesn't identify with a religion	274	19.83
Less than once a month	209	15.09
Once a month or more, but less than once a week	182	16.50
Once a week or more	489	48.62
Total	1154	100.00
Highest parental education (Wave I)		
Less than high school	52	4.15
Completed high school or GED	388	36.36
Some college	269	21.53
College graduate or higher	419	37.96
Total	*1128*	*100.00*
Quality of relationship with parents: Closeness to parents (Wave I)		
Mean	4.45	
Total	1154	
		100.00
Age (Wave I)		
Mean	*15.68*	
Total	*1154*	
		100.00

V.1.4. Univariate analysis: STI/HIV risk behaviors variables

Means and standard errors for the STI/HIV risk behaviors and friendship variables by gender and race are presented in tables V.6, V.7 & V.8. Table V.9 presents the simple regression models that examine the relationship between STI/HIV risk behaviors and friendship variables, and respondents' age.

At Wave I, the mean number of STI/HIV risk behaviors respondents had engaged in was 0.97. The scale ranged from 0 to 8. The mean number of STI/HIV risk behaviors for males (0.64) was significantly lower than that for females (1.18, p<0.001). No differences were observed between Black and White adolescents. Older adolescents had higher STI/HIV risk behaviors than younger ones (b = 0.41 p < 0.001).

In emerging adulthood, at Wave III, the mean number of STI/HIV risk behaviors respondents had engaged in was 3.26. The scale ranged from 0 to 7, and no missing cases were noted. The mean number of STI/HIV risk behaviors in emerging adulthood was slightly higher for males than for females but the difference was not significant (3.31 and 3.22 respectively). White adolescents engaged in slightly fewer STI/HIV risk behaviors than their Black counterparts (means = 3.25 vs. 3.37) but the difference was again not significant. No differences in STI/HIV risk behaviors in emerging adulthood were noted by age.

Given the unexpected difference in STI/HIV risk behaviors in adolescence between males and females – with females in the sample having higher STI/HIV risk behaviors at Wave I than males – a gender comparison of the behaviors used to create this scale was conducted. This analysis was also performed for the behaviors used to create the scale for STI/HIV risk behaviors in emerging adulthood. Results are presented in tables V.10 and V.11. At Wave I, significant differences were observed between males and females on 3 behaviors (sexual activity, number of sex partners, frequency of condom use), with females reporting higher risk behaviors than males. However, at Wave III, no significant differences by gender were observed for any of these behaviors. A

significant difference between males and females was only observed for the behavior "sex in exchange for drugs or money," with more males than females reporting engagement in this behavior. Racial differences were also examined for these components at Waves I and III. Only the variables "number of sex partners" and "condom use" at Wave III showed a significant racial difference: more Black adolescents than White reported having 2 or more sexual partners during the 12 months preceding the survey. However, more White adolescents reported inconsistent condom use, as compared with Black adolescents.

V.1.5. Univariate analysis: Friendship variables

Respondents nominated a mean number of 5.9 friends. Of those, a mean number of 4 friends were included in Add Health whereas a mean number of 2.0 were not included either because (1) the friends did not attend the same school as the respondent or (2) the friends attended the same sister or sample school as the respondent but could not be located on the school roster. As a result, these nominated friends were not included in the analyses since it would not have been possible to use their self-reported data. Therefore, only respondents who have nominated at least one friend included in Add Health were included in this study. A variable computed to determine the difference between the number of nominated friends included in Add Health and those who were not included showed that more than 30% of respondents had nominated more friends who were not included in Add Health (Table V.8). The mean numbers of friends included in Add Health reported by males and females were (3.90 vs. 3.98 respectively). White adolescents nominated, on average, 3.99 friends, while Black adolescents nominated 3.27 but the difference was not significant. No differences in number of friends were noted by age.

Behavioral closeness to friends at Wave I ranged from 0 to 5 with a mean of 2.18. Only 5% of respondents did not report any behavioral closeness to their friends i.e. did not engage in any activities with any friends over the week preceding the survey (reminder: A total score for behavioral closeness to each friend was based on the number of activities engaged in together over the past week

(1=yes, 0=no). Then the scores for each of the nominated friends were averaged to determine the behavioral closeness to friends). Males reported slightly lower levels of behavioral closeness to their friends than females, and the difference was significant (2.03 vs. 2.27 respectively; p<0.001). White and Black adolescents reported similar levels of behavioral closeness (2.19 vs. 1.92 respectively, the difference was not significant). Behavioral closeness was higher among older respondents (b = 0.15 p < 0.001).

Emotional closeness to friends at Wave I ranged from 0 to 1, with a mean of 0.41. Almost one-fourth of respondents did not report any emotional closeness to friends (no reciprocated friendships). No significant differences in emotional closeness were observed by gender or race. Older adolescents had significantly higher emotional closeness to their friends as compared to younger adolescents (b = 0.02; p < 0.01).

STI/HIV risk behaviors of friends at Wave I ranged from 0 to 7, with a mean of 1.05. More than half of the sample (55.36%) had friends who did not engage in any STI/HIV risk behaviors. The mean number of friends' STI/HIV risk behaviors for males was lower than that for females (0.88 vs. 1.16 p<0.05). The mean numbers of friends' STI/HIV risk behaviors for Black and White adolescents were similar (1.04 vs. 1.18). Age differences were observed: older adolescents had friends' with higher STI/HIV risk behaviors than younger ones (b = 0.43; p < 0.001).

Table V.6 - Means and standard errors for the STI/HIV risk behaviors and friendship variables included in the analysis, by gender

Variable	n	Males Mean	SE	n	Females Mean	SE	n	Total Mean	SE
STI/HIV risk behaviors in adolescence	463	0.64***	0.17	691	1.18	0.27	1154	0.97	0.23
STI/HIV risk behaviors in emerging adulthood	454	3.31	0.12	700	3.22	0.06	1154	3.26	0.06
[+]Number of friends (included in the study) (range: 1-10)	463	3.90	0.39	691	3.99	0.53	1154	3.95	0.47
Number of friends (not included in the study) (range: 1-10)	463	1.89	0.15	691	2.08	0.15	1154	2.00	0.13
Total number of friends (included & not included in the study) (range: 1-10)	463	5.79	0.42	691	6.06	0.54	1154	5.96	0.48
Behavioral closeness to friends (range: 0-5)	463	2.03***	0.12	691	2.28	0.10	1154	2.18	0.10
Emotional closeness to friends (range: 0-1)	463	0.38	0.04	691	0.43	0.03	1154	0.41	0.03
Friends' STI/HIV risk behaviors (range 0-7)	463	0.88*	0.21	691	1.16	0.29	1154	1.05	0.25

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

[+]This is the variable used to test the study hypotheses

Table V.7 - Means and standard errors for the STI/HIV risk behaviors and friendship variables included in the analysis, by race.

Variable	n	Whites Mean	SE	n	Blacks Mean	SE	n	Total Mean	SE
STI/HIV risk behaviors in adolescence	952	0.97	0.24	202	1.02	0.50	1154	0.97	0.23
STI/HIV risk behaviors in emerging adulthood	939	3.25	0.06	195	3.37	0.21	1154	3.26	0.06
[+]Number of friends (<u>included</u> in the study) (range: 1-10)	952	3.99	0.49	202	3.27	0.23	1154	3.95	0.47
Number of friends (<u>not</u> included in the study) (range: 1-10)	952	1.97*	0.13	202	2.56	0.29	1154	2.00	0.13
Total number of friends (<u>included</u> & <u>not included</u> in the study) (range: 1-10)	952	5.96	0.51	202	5.83	0.29	1154	5.96	0.48
Behavioral closeness to friends (range: 0-5)	952	2.19	0.10	202	1.92	0.28	1154	2.18	0.10
Emotional closeness to friends (range: 0-1)	952	0.41	0.03	202	0.31	0.05	1154	0.41	0.03
Friends' STI/HIV risk behaviors (range 0-7)	952	1.04	0.27	202	1.18	0.36	1154	1.05	0.25

* $p<.05$ **$p<.01$ ***$p<.001$
[+]This is the variable used to test the study hypotheses

Table V.8 - Frequency distribution of the difference between nominated friends included in Add Health and those who were not, by gender

	Males N (%)	Females N (%)	Total N (%)
Difference between in-study and out-of-study friend nominations			
In-study = out-of-study nominations	98 (25.35)	105 (13.40)	172 (13.72)
In-study < out of study nominations	88 (15.94)	172 (18.65)	260 (17.58)
In-study > out of study nominations	308 (69.86)	414 (67.94)	722 (68.70)
Total	*463 (100.00)*	*691 (100.00)*	*1154 (100.00)*

Table V.9 - Linear regression estimates for the STI/HIV risk behaviors and friendship variables included in the analysis, by age.

	STI/HIV risk behaviors in adolescence	STI/HIV risk behaviors in emerging adulthood	+Number of friends (<u>included</u> in the study) (range: 1-10)	Number of friends (<u>not</u> included in the study) (range: 1-10)
Age (b coefficients)	0.41***	0.01	0.20*	0.15
SE	0.05	0.05	0.08	0.09
n	1154	1134	1154	1154

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

Table V.9. cont'd

	Total number of friends (<u>included</u> & <u>not included</u> in the study) (range: 1-10)	Behavioral closeness to friends (range: 0-5)	Emotional closeness to friends (range: 0-1)	Friends' STI/HIV risk behaviors (range 0-7)
Age (b coefficients)	0.34*	0.15***	0.03**	0.43***
SE	0.14	0.03	0.01	0.06
n	1154	1154	1154	1154

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

Table V.10 - Gender and racial differences in the behaviors used to create the scale for STI/HIV risk behaviors in adolescence (Wave I)

Measures at Wave I	Males		Females		Whites		Blacks	
	N	%	N	%	N	%	N	%
Sexual activity	***							
No	343	82.4	434	73.33	670	77.16	107	72.54
Yes	120	17.6	257	26.67	282	22.84	95	27.46
Total	463	*100.00*	691	*100.00*	952	*100.00*	202	*100.00*
Number of sexual partners (ever)	***							
0 partners/never had sex	375	86.15	437	72.66	685	77.88	127	79.34
1 partner	48	7.02	103	10.35	124	9.08	27	8.48
2 or more partners	40	6.83	151	16.99	143	13.04	48	12.18
Total	463	*100.00*	691	*100.00*	952	*100.00*	202	*100.00*
Frequency of condom use	***							
Have never had sex	343	82.4	434	73.33	670	77.16	107	72.54
Always used condoms	71	10.94	96	7.24	120	8.36	47	14.23
Inconsistent/Never	49	6.66	161	19.43	162	14.48	48	13.23
Total	463	*100.00*		*100.00*	952	*100.00*	202	*100.00*
Have ever had sex in exchange for drugs or money								
No	459	99.47	682	99.38	941	99.39	200	99.8
Yes	4	0.53	9	0.62	11	0.61	2	0.2
Total	463	*100.00*	691	*100.00*	952	*100.00*	202	*100.00*
Injection drug use (ever)								
No	462	99.96	691	100.00	951	99.98	202	100.00
Yes	1	0.04	0	0.00	1	0.2	0	0.0
Total	463	*100.00*	691	*100.00*	952	*100.00*	202	*100.00*
MSM								
No		--		--	948	99.83	201	99.89
Yes		--		--	4	0.17	1	0.11
Total					852	*100.00*	202	*100.00*
STI/HIV risk behaviors								
Mean		0.64		1.18		0.97		1.02
Total		*100.00*		*100.00*		*100.00*		*100.00*

⁺p=.05 * p<.05 **p<.01 ***p<.001

Table V.11 - Gender and racial differences in the behaviors used to create the scale for STI/HIV risk behaviors in emerging adulthood (Wave III)

Measures at Wave III	Males		Females		Whites		Blacks	
	N	%	N	%	N	%	N	%
Sexual activity								
No	66	13.91	99	14.23	127	14.14	38	13.46
Yes	396	86.09	586	85.77	820	85.86	162	86.54
Total	462	*100.00*	685	*100.00*	947	*100.00*	200	*100.00*
Number of sexual partners during the 12 months preceding the survey	+				***			
0 partners/never had sex	104	23.41	159	23.11	204	23.21	59	23.47
1 partner	228	49.32	359	57.16	519	55.37	68	32.42
2 or more partners	124	27.27	168	19.74	222	21.42	70	44.12
Total	456	*100.00*	686	*100.00*	945	*100.00*	197	*100.00*
Frequency of condom use during the 12 months preceding the survey					**			
Have never had sex	104	23.41	159	23.08	204	23.22	59	23.19
Always used condoms	99	17.5	106	15.7	163	15.71	42	28.05
Inconsistent/Never	253	59.08	422	61.21	577	61.08	98	48.77
Total	456	*100.00*	687	*100.00*	944	*100.00*	199	*100.00*
Have had sex in exchange for drugs or money during the past 12 months	***							
No	457	99.19	690	99.99	949	99.67	198	99.79
Yes	5	0.81	1	0.01	3	0.33	3	0.21
Total	462	*100.00*	691	*100.00*	952	*100.00*	201	*100.00*
Injection drug use during the 12 months preceding the survey								
No	461	99.86	691	100.00	950	99.94	202	100.00
Yes	2	0.14	0	0.00	2	0.06	0	0.00
Total		*100.00*	691	*100.00*	952	*100.00*	202	*100.00*
MSM								
No		--		--	945	99.32	201	99.61
Yes		--		--	7	0.68	1	0.39
Total					952	*100.00*	202	*100.00*
STI/HIV risk behaviors								
Mean		3.31		3.22		3.25		3.37
Total		*100.00*		*100.00*		*100.00*		*100.00*

[+]p=.05 * p<.05 **p<.01 ***p<.001

V.1.6. Diagnostics for the variables: tests of normality and correlations

Tests for skewness and kurtosis were performed on each of the STI/HIV risk behaviors and friendship variables. Skewed values ultimately inflate the X^2 and excessive kurtosis leads to frequent rejection of the null hypothesis. Table V.12 shows the skewness and kurtosis values for the study's outcome and predictors. All study variables, except for emotional closeness to friends, had kurtosis and skewness values close to that of a normal distribution (for a normal distribution: skewness = 0 and kurtosis =3).

Table V.13 shows the correlation matrix for the study's independent variables. Weak correlations were noted among all the variables.

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Table V.12 - Skewness and Kurtosis values for the outcome and predictor variables[1].

Variable	Skewness	Kurtosis
STI/HIV risk behaviors in adolescence	0.94	2.28
STI/HIV risk behaviors in emerging adulthood	-0.92	2.92
Number of friends	0.73	2.59
Behavioral closeness to friends	0.12	2.35
Emotional closeness to friends	0.44	1.95
Friends' STI/HIV risk behaviors	0.77	2.30

[1]A normal distribution has a skewness of 0 and a kurtosis of 3 (according to the formulas that Stata uses for these calculations)

Table V.13 - Pearson correlations, adjusted for survey design, between the study's main predictors.

	STI/HIV risk behaviors in adolescence	Number of friends	Behavioral closeness to friends	Emotional closeness to friends	Friends' STI/HIV risk behaviors
STI/HIV risk behaviors in adolescence	1.00				
Number of friends	-0.05	1.00			
Behavioral closeness to friends	0.26***	-0.12***	1.00		
Emotional closeness to friends	0.02	-0.05	0.30***	1.00	
Friends' STI/HIV risk behaviors	0.48***	0.03	0.23***	0.01	1.00

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

V.2. Hypotheses Testing

Table V.14 summarizes all the results from the hypotheses testing. Specific tables are then presented for each of the study's aims.

V.2.1. Aim I results

V.2.1.1. Research Questions 1 & 2

In this aim, I propose to examine the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood, and investigate gender and racial differences in this relationship. Hypothesis H1.1 suggested that there will be a positive relationship between STI/HIV risk behaviors in emerging adulthood and in adolescence, and hypotheses H2.1 and H2.2 proposed interactional models in which the effects of the STI/HIV risk behaviors in adolescence on STI/HIV risk behaviors in emerging adulthood will vary by gender (H2.1) or race (H2.2). In hypothesis H2.1, I postulated that there will be a stronger positive relationship between STI/HIV risk behaviors in emerging adulthood and in adolescence for males than for females. In hypothesis H2.2, I suggested that that there will be a stronger positive relationship between STI/HIV risk behaviors in emerging adulthood and in adolescence for Blacks than for Whites.

To test hypothesis H1.1, a linear regression model was fit that included STI/HIV risk behaviors in adolescence as the independent variable, and respondents' age, relationship with parents, SES, involvement in a romantic relationship and religiosity as the controls. In addition, gender and race were controlled. However, since hypotheses 2.1 and 2.2 postulated a moderating effect for gender and race, it was appropriate to test these hypotheses first; in the event these hypotheses were not supported, a main effect model for gender and race would be fitted, thereby addressing hypothesis H1.1.

A linear regression model including two-way interaction terms between STI/HIV risk behaviors in adolescence and gender or race ethnicity was fitted to test hypotheses H2.1 and H2.2. However, none of the interaction terms was statistically significant, thus the hypotheses were not

supported, and it was concluded that neither gender, nor race moderated the relationship between STI/HIV risk behaviors in emerging adulthood and in adolescence. Therefore, I dropped these interactions from the model and tested the main effects model.

In the main effects model, multiple linear regression provided evidence of a statistically positive significant relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood (b = 0.13; 95% CI: 0.07 – 0.20) (Table V.15). However, as evidenced by the regression line in Figure V.1, the relationship was modest (slope was not very steep). Neither race nor gender were significantly associated with STI/HIV risk behaviors in emerging adulthood. Involvement in a romantic relationship in adolescence was positively associated with STI/HIV risk behaviors in emerging adulthood (b = 0.67; 95% CI: 0.48 – 0.80). Religiosity, on the other hand, was negatively associated with STI/HIV risk behaviors in emerging adulthood: adolescents who attended religious services more frequently had lower STI/HIV risk behaviors in emerging adulthood than adolescents who attended religious services less frequently (b = -0.21; 95% CI: -0.33 ; -0.09). The quality of adolescents' relationship with their parents, as well as their parents' education were also negatively associated with STI/HIV risk behaviors in emerging adulthood; a closer relationship with parents (b = -0.01; 95% CI: -0.13 ; 0.12) and higher parental education (b = -0.21; 95% CI: -0.31 ; -0.11) were associated with lower STI/HIV risk behaviors in emerging adulthood. Finally, age showed a negative association with STI/HIV risk behaviors in emerging adulthood, with younger respondents having higher STI/HIV risk behaviors in emerging adulthood, after controlling for baseline STI/HIV risk behaviors (b = -0.14; 95% CI: -0.27 ; -0.02).

Table V.14 - Summary of relationships examined for each of the study's aims: significance of predictors, directions of associations and moderation effects*

Outcome	Predictor	Moderation by gender	Moderation by race
AIM I			
STI/HIV risk behaviors in emerging adulthood	STI/HIV risk behaviors in adolescence (+)	No	No
AIM II			
STI/HIV risk behaviors in adolescence	Number of friends (-)	No	No
	Behavioral closeness to friends (0)	No	No
	Emotional closeness to friends (0)	No	No
	Friends' STI/HIV risk behaviors (+)	Yes, stronger for females	No
Number of friends	Gender (0)	--	--
	Race (0)	--	--
Behavioral closeness to friends	Gender (+)	--	--
	Race (0)	--	--
Emotional closeness to friends	Gender (0)	--	--
	Race (0)	--	--
Friends' STI/HIV risk behaviors	Gender (+)	--	--
	Race (0)	--	--
AIM III			
STI/HIV risk behaviors in emerging adulthood	STI/HIV risk behaviors in adolescence (+)		
	Number of friends (0)		
	Behavioral closeness to friends (+)		
	Emotional closeness to friends (0)		
	Friends' STI/HIV risk behaviors (0)	No	No
	Number of friends* Friends' STI/HIV risk behaviors (0)		
	Behavioral closeness to friends * Friends' STI/HIV risk behaviors (0)		
	Emotional closeness to friends * Friends' STI/HIV risk behaviors (0)		

* (0) indicates the relationship is not significant and (--) indicates that the moderation was not examined.

Table V.15 - Linear regression estimates of STI/HIV risk behaviors in emerging adulthood –
Reduced model (non-significant interactions are removed).

Variable	b	SE	95% CI	
STI/HIV risk behaviors in adolescence	0.13***	0.03	0.07	0.20
Gender (Female)	-0.26	0.14	-0.54	0 .02
Race (Black)	0.39	0.21	-0.02	0.81
Age	-0.14**	0.07	-0.27	-0.01
Quality of relationship with parents	-0.01	0.06	-0.13	0.12
Highest parental education	-0.21***	0.05	-0.31	-0.11
Involvement in a romantic relationship	0.64***	0.08	0.48	0.80
Frequency of attendance of religious services	-0.21**	0.06	-0.33	-0.09
Intercept	6.20***	1.24	3.74	8.65
R^2	0.12			
n	1109			

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

Figure V-1. Relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood: Best fit line
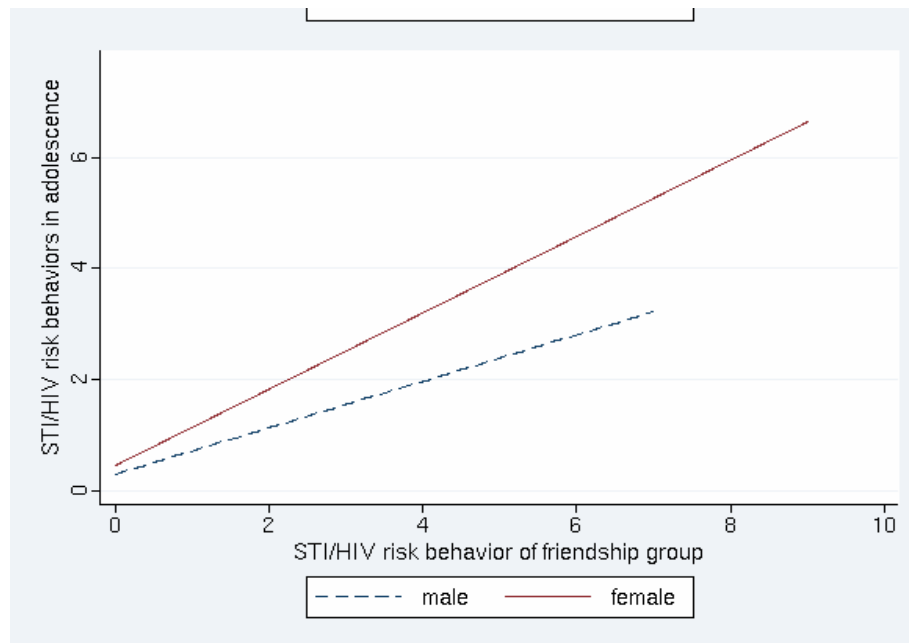
V.2.2.   Aim II results

V.2.2.1. Research Questions 3 and 4

Aim II seeks to examine the association between adolescents' STI/HIV risk behaviors and three friendship dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk behaviors, and to determine whether the association varies by gender and race. In the first set of hypotheses for aim II, I posited that STI/HIV risk behaviors in adolescence are not associated with either number of friends (H3.1) or emotional and behavioral closeness to friends (H3.2); I suggested that they are, however, positively associated with friends' STI/HIV risk behaviors (H3.3). Four linear regression models were fitted, each with STI/HIV risk behaviors in adolescence as the outcome variable and one of the friendship dimensions as the predictor. The models controlled for age, relationship with parents, religiosity, involvement in a romantic relationships and SES as well as gender and race. However, since hypotheses H4.1- H4.3 propose the investigation of the moderating effect of gender and race, the results of this analysis (testing moderation) will be presented first to determine if the presentation of a main effects model is warranted. Please refer to Table V.16 for the output.

In hypotheses H4.1- H4.3, I proposed that the associations between STI/HIV risk behaviors in adolescence and number of friends (H4.1), emotional or behavioral closeness to friends (H4.2) or friends' STI/HIV risk behaviors (H4.3) would not vary by gender or race. Four linear regression models were fitted, each with STI/HIV risk behaviors in adolescence as the outcome variable, one of the friendship dimensions as the predictor, gender and race as the moderator. The models controlled for respondents' age, relationship with parents, SES, involvement in a romantic relationship and religiosity. Two-way interaction terms for the friendship dimension with either gender or race were included in each model. In the case of a moderation effect, further analyses would be conducted separately for each gender or racial group. If no moderation effects were observed, the interaction terms would be removed from the model and the main effects assessed. Please refer to Table V.16 for the output pertaining to these research questions.

The relationship between STI/HIV risk behaviors in adolescence and number of friends was not moderated by gender or race, thereby supporting hypothesis H4.1. Therefore interaction terms were dropped from the model to assess the main effects of number of friends on STI/HIV risk behaviors in adolescence. The main effects model provided evidence for a statistically significant negative relation between number of friends and STI/HIV risk behaviors in adolescence, thus failing to support hypothesis H3.1: adolescents with more friends were engaged in less STI/HIV risk behaviors (b = -0.06; 95% CI: -0.08 ; -0.03). However, this finding was not supported when considering the total number of nominated friends (as opposed to just the friends included in Add Health).

The relationship between STI/HIV risk behaviors in adolescence and either behavioral closeness to friends or emotional closeness to friends did not vary by gender or race, thus supporting hypothesis H4.2. Therefore, interaction terms were dropped from the model to assess the main effects. In the main effects models, linear regression failed to provide evidence of a statistically significant relationship between behavioral or emotional closeness to friends and STI/HIV risk behaviors in adolescence, thereby supporting hypothesis H3.2. However, gender and race were significantly associated with STI/HIV risk behaviors in adolescence in both models, with females and Blacks having higher STI/HIV risk behaviors than males and Whites.

The relationship between STI/HIV risk behaviors in adolescence and friends STI/HIV risk behaviors varied by gender, as evidenced by a significant *friends' risk behavior*gender* interaction term (b = 0.25; 95% CI: 0.15 ; 0.35), but not by race, thus providing partial support for hypothesis H4.3. Separate analyses were then conducted to assess the relationship between STI/HIV risk behaviors in adolescence and friends' STI/HIV risk behaviors for each gender (Tables V.17 and V.18). Findings indicate that for both males and females, higher friends' STI/HIV risk behaviors were associated with higher STI/HIV risk behaviors in adolescence. However, the magnitude of the relationship differed by gender, with the association for females being greater than that for males: b = 0.32; 95% CI: 0.13 ; 0.51 for males ; b = 0.55; 95% CI: 0.39 ; 0.72 for females). Figure V.2

97

illustrates the friends' risk behavior by gender interaction: the slope for females is steeper than that for males, indicating a stronger association between respondents' STI/HIV risk behaviors and the risk behaviors of the friendship group for females. Findings also support hypothesis H3.3, which suggested that STI/HIV risk behaviors in adolescence are positively associated with friends' STI/HIV risk behaviors. Further, the contribution of the fitted models including friends' STI/HIV risk behaviors to the respondents' STI/HIV risk behaviors in adolescence was greater for females than males (R^2 for females=0.44; (R^2 for males=0.30).

Table V.16 - Linear regression estimates of STI/HIV risk behaviors in adolescence – Final models (interactions removed when not significant).

	Number of friends predicting STI/HIV risk behaviors in adolescence		*Behavioral closeness predicting STI/HIV risk behaviors in adolescence*		*Emotional closeness predicting STI/HIV risk behaviors in adolescence*		*Friends' STI/HIV risk behaviors predicting STI/HIV risk behaviors in adolescence*	
	b	**SE**	**b**	**SE**	**b**	**SE**	**b**	**SE**
Number of friends	-0.06***	0.01	--	--	--	--	--	--
Number of friends * Gender	--	--	--	--	--	--	--	--
Number of friends * Race	--	--	--	--	--	--	--	--
Behavioral closeness to friends	--	--	0.20	0.10	--	--	--	--
Behavioral Closeness * Gender	--	--	--	--	--	--	--	--
Behavioral Closeness * Race	--	--	--	--	--	--	--	--
Emotional closeness to friends	--	--	--	--	0. 12	0.07	--	--
Emotional Closeness * Gender	--	--	--	--	--	--	--	--
Emotional Closeness * Race	--	--	--	--	--	--	--	--
Friends' risk behaviors	--	--	--	--	--	--	0.06	0.15
Friends' risk behaviors * Gender	--	--	--	--	--	--	0.25***	0.05
Friends' risk behaviors * Race	--	--	--	--	--	--	--	--
Gender (Female)	0.37**	0.12	0.33**	0.10	0.36**	0.11	0.04	0.06
Race (Black)	0.7*	0.22	0.72**	0.22	0.71**	0.23	0.35	0.20
Age	0.27***	0.06	0.24***	0.06	0.26***	0.06	0.09	0.05
Quality of relationship with parents	-0.24*	0.10	-0.24*	0.11	-0.24*	0.10	-0.21	0.11
Highest parental education	-0.28***	0.07	-0.29***	0.08	-0.29***	0.08	-0.23***	0.06
Involvement in a romantic relationship	0.99***	0.26	0.92***	0.23	0.97***	0.26	0.79**	0.24
Frequency of attendance of religious services	-0.08	0.06	-0.08	0.06	-0.08	0.06	0.01	0.06
Intercept	-2.78**	1.02	-2.89**	1.00	-2.90**	1.01	-0.25	0.72
R^2	*0.29*		*0.30*		*0.28*		*0.41*	
n	*1128*		*1128*		*1128*		*1128*	

* $p<.05$ ** $p<.01$ *** $p<.001$
Note1: (--) indicates the variable is not included in the model
Note2: Results of the most parsimonious model are displayed (i.e., model excludes non-significant interactions)

Table V.17 - Linear regression coefficients of friends' STI/HIV risk behaviors predicting STI/HIV risk behaviors in adolescence, for males.

| Variable	b	SE	95% CI	
Friends' STI/HIV risk behaviors	0.32**	0.09	0.13	0.51
Race (Black)	0.51	0.18	0.15	0.86
Age	0.07*	0.03	0.01	0.12
Quality of relationship with parents	-0.18*	0.08	-0.33	-0.029
Highest parental education	-0.13	0.10	-0.32	0.07
Involvement in a romantic relationship	0.85***	0.18	0.49	1.20
Frequency of attendance of religious services	-0.05	0.05	-0.15	0.05
Intercept	-0.32	0.71	-1.73	1.08
R^2	0.30			
n	456			

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

Table V.18 - Linear regression coefficients of friends' STI/HIV risk behaviors predicting STI/HIV risk behaviors in adolescence, for females.

Variable	b	SE	95% CI	
Friends' STI/HIV risk behaviors	0.55***	0.08	0.39	0.72
Race (Black)	0.25	0.23	-0.21	0.71
Age	0.12	0.08	-0.05	0.28
Quality of relationship with parents	-0.22	0.14	-0.50	0.07
Highest parental education	-0.30*	0.11	-0.52	-0.07
Involvement in a romantic relationship	0.72*	0.32	0.10	1.34
Frequency of attendance of religious services	0.05	0.092	-0.14	0.23
Intercept	-0.32	0.71	-2.39	1.79
R^2	0.43			
n	672			

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

Figure V-2. Association between friends' STI/HIV risk behaviors in adolescence and respondents' STI/HIV risk behaviors in adolescence, by gender
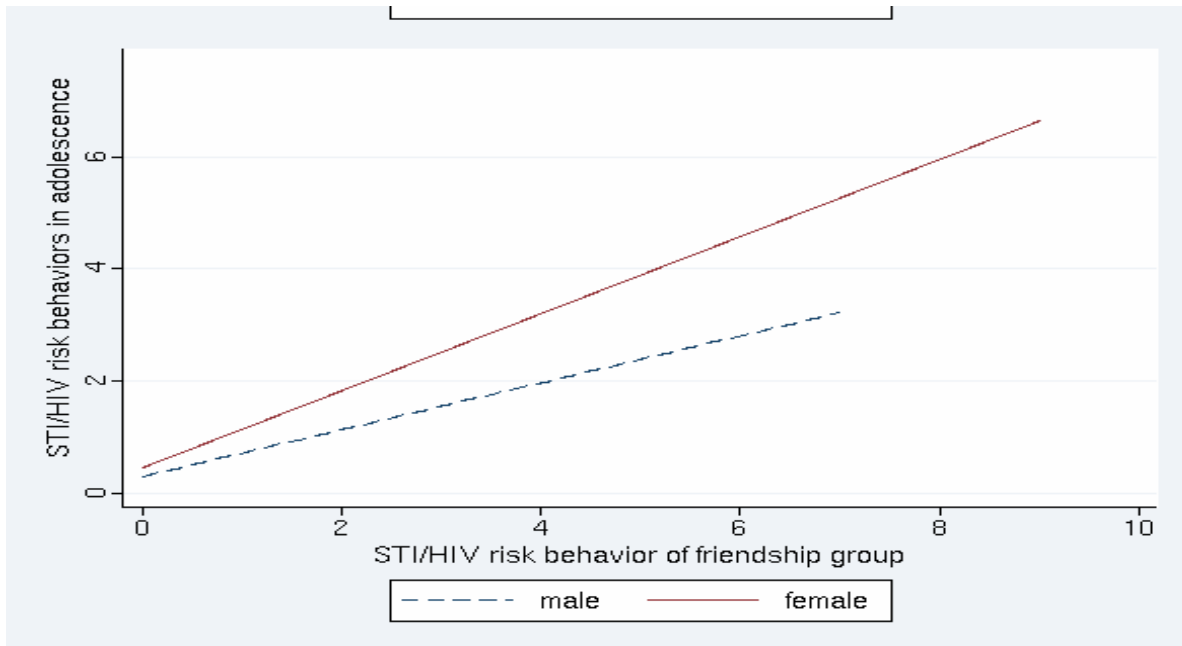
V.2.2.2. Research Question 5

Finally, hypotheses H5.1 – H5.7 examine the association between friendship dimensions and race or gender. I proposed that number of friends (H5.1) and emotional and behavioral closeness (H5.2) to friends vary by race, but friends' STI/HIV risk behaviors (H5.3) do not. I hypothesize that Black adolescents will report fewer friends and less emotional closeness to their friends than White adolescents. I also suggested that number of friends (H5.4) and friends' STI/HIV risk behaviors (H5.7) do not vary by gender, whereas emotional and behavioral closeness to friends do (H5.5; H5.6): I hypothesized that males will report less emotional and more behavioral closeness to their friends. Please refer to Table V.19 for the output pertaining to this research question.

Findings indicate that number of friends, emotional closeness to friends, and behavioral closeness to friends were not associated with racial group, thus failing to support hypotheses H5.1 and H5.2. Friends' STI/HIV risk behaviors were also not associated with racial group, but this was in support of hypothesis H5.3.

Number of friends was not associated with gender, thus supporting hypothesis H5.4. Behavioral closeness to friends was associated with gender, with females experiencing more behavioral closeness to their friends than males, a finding in a direction opposite to that suggested by hypothesis H5.6 (b = 0.25; 95% CI: 0.12 ; 0.38). Emotional closeness to friends, on the other hand, was not associated with gender, thus indicating a lack of support for hypothesis H5.5. Finally, friends' STI/HIV risk behaviors were associated with gender, with females having friends with higher STI/HIV risk behaviors than males, a finding that does not support hypothesis H5.7 (b = 0.27; 95% CI: 0.06 ; 0.49).

Table V.19 - Linear regression coefficients of gender and race predicting number of friends, behavioral closeness to friends, emotional closeness to friends and friends' STI/HIV risk behaviors.

	Outcome							
	Number of friends		**Behavioral closeness to friends**		**Emotional closeness to friends**		**Friends' STI/HIV risk behaviors**	
	b	**SE**	**b**	**SE**	**b**	**SE**	**b**	**SE**
Gender (Female)	0.09	0. 19	0.25***	0.07	0.06	0.03	0.27*	0. 11
Race (Black)	-0.73	0. 53	-0.28	0.29	-0.11	0. 06	0. 13	0. 42
Intercept	4.58	0. 77	2.07	0.36	0.43	0. 11	0.48	0. 54
n	1154		1154		1154		1154	

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

V.2.3. Aim III results

In Aim III, I propose to examine the effects of interactions among friendship dimensions in adolescence on emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk behaviors; and investigate gender and racial differences in these associations. Similarly to aims I and II, the interactions by gender and race will be examined first, before analyzing the main effects models.

V.2.3.1. Moderation by gender & race (Research Question 8)

In hypotheses H8.1 and H8.2, I suggested that the proposed moderation model (friends' STI/HIV risk behaviors moderating the relationship between STI/HIV risk behaviors in emerging adulthood and number of friends, behavioral and emotional closeness to friends) does not vary by gender and race. To test hypothesis H8.1, I fitted a linear regression model with STI/HIV risk behaviors in emerging adulthood as the outcome variable, and including (1) STI/HIV risk behaviors in adolescence, number of friends, behavioral and emotional closeness to friends, friends STI/HIV risk behaviors, gender, race; (2) two-way interaction terms between friends' STI/HIV risk behaviors and each of number of friends, behavioral and emotional closeness to friends; (3) two-way interaction terms between gender and each of the friendship dimensions, (4) three-way interaction terms between gender, friends' STI/HIV risk behaviors and either number of friends, behavioral or emotional closeness to friends; and (5) control variables. As suggested by the hypotheses, none of the individual three-way interaction terms was statistically significant, thus it was concluded that the posited moderation model did not differ by gender. Therefore, I dropped the three-way interactions from the model to test the model for the interaction between friends' STI/HIV risk behaviors, number of friends, emotional and behavioral closeness to friends, with the main effect for gender.

Similarly, to test hypothesis H8.2, I fitted a linear regression model comparable to the one used to test hypothesis H8.1, except I included race instead of gender in the interactions. As suggested by the hypotheses, none of the individual three-way interaction terms was statistically

significant, thus it was concluded that the posited moderation model did not differ by race. I dropped the three-way interactions from the model to test the model for the interaction between friends' STI/HIV risk behaviors, number of friends, emotional and behavioral closeness to friends, with the main effect for race.

V.2.3.2. Moderation by friends' STI/HIV risk behaviors (Research Questions 6 & 7)

Next, the proposed model of the interaction between friends' STI/HIV risk behaviors, number of friends, emotional and behavioral closeness to friends was tested to address hypotheses H6.1, H7.1 and H7.2. Given that there was no evidence that this model differed by gender or race, both variables were only included as lower order covariates (no three-way interaction terms).

For hypotheses H6.1, H7.1 and H7.2, I hypothesized that friends' STI/HIV risk behaviors would moderate the relationship between number of friends, emotional and behavioral closeness to friends and STI/HIV risk behaviors in emerging adulthood, controlling for STI/HIV risk behaviors in adolescence. This hypothesis was tested by a linear regression model that included the aforementioned variables, as well as interaction terms for friends' STI/HIV risk behaviors with each of the friendship dimensions. The model also included gender, race and the control variables (respondents' age, relationship with parents, SES, involvement in a romantic relationship and religiosity). None of the individual two-way interaction terms was statistically significant, thus the hypotheses were not supported, and it was concluded that friends' STI/HIV risk behaviors did not moderate the relationships between number of friends, emotional or behavioral closeness to friends and STI/HIV risk behaviors in emerging adulthood. Therefore, I dropped these interactions from the model and tested the main effects model (Table V.20).

In the main effects model, linear regression analysis provided evidence of a positive statistically significant relationship between behavioral closeness to friends and STI/HIV risk behaviors in emerging adulthood. Higher behavioral closeness to friends was associated with higher STI/HIV risk behaviors in emerging adulthood, controlling for STI/HIV risk behaviors in adolescence and the control variables (b = 0.12; 95% CI: 0.06; 0.17). Neither number of friends nor emotional

closeness to friends in adolescence predicted STI/HIV risk behaviors in emerging adulthood. Age, highest parental education and frequency of attendance of religious services had a significant negative association with STI/HIV risk behaviors in emerging adulthood (b= -0.19; 95% CI: -0.34; -0.04 for age – and b= -0.21; 95% CI: -0.31; -0.11 for parental education – and b= -0.20; 95% CI: -0.30; -0.10).

Table V.20 - Linear regression estimates of STI/HIV risk behaviors in emerging adulthood – Reduced model (non-significant interactions are removed).

Variable	b	SE	95% CI	
STI/HIV risk behaviors in adolescence	0.08***	0.02	0.05	0.12
Number of friends	0.02	0.02	-0.01	0.05
Behavioral closeness to friends	0.12***	0.03	0.06	0.17
Emotional closeness to friends	0.14	0.17	-0.20	0.47
Friends' risk behaviors	0.11	0.07	-0.02	0.24
Gender (Female)	-0.30**	0.14	-0.58	-0.02
Race (Black)	0.38	0.22	-0.05	0.82
Age	-0.19**	0.08	-0.34	-0.04
Quality of relationship with parents	0.01	0.06	-0.13	0.13
Highest parental education	-0.21***	0.05	-0.31	-0.11
Involvement in a romantic relationship	0.60***	0.08	0.45	0.75
Frequency of attendance of religious services	-0.20***	0.05	-0.30	-0.10
Intercept	6.51***	1.34	3.85	9.16
R^2	0.14			
n	1109			

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

VI. Discussion

This chapter includes a discussion of my study findings. First, I summarize my results and discuss them within the context of previous studies. Second, I present some of the study's strengths and limitations. Finally, I will conclude with the practical implications and the areas of future research.

VI.1. Discussion of findings

VI.1.1. Discussion of findings for Aim I

Multiple linear regression models were used to examine the relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood, and to investigate gender and racial differences in this relationship. There were no significant interactions between either gender or race with STI/HIV risk behaviors in adolescence. However, STI/HIV risk behaviors in adolescence independently predicted STI/HIV risk behaviors in emerging adulthood: higher STI/HIV risk behaviors in adolescence were associated with higher STI/HIV risk behaviors in emerging adulthood. In this section, I will first discuss the findings related to the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood (RQ1), and follow with a discussion of the findings related to gender and racial differences (RQ2).

VI.1.1.1. Relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood (RQ1)

The first hypothesis for aim I (H1.1) suggested that there will be a positive relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood. Adolescence is viewed as a critical life stage that shapes individuals' development, especially regarding behavioral outcomes such as sexual activity and substance use (Maggs & Hurrelmann, 1998). While engagement in these risk behaviors in adolescence could be considered as part of normative

adolescent development (He et al., 2004; Lerner et al., 2005; Lerner & Castellino, 2002; Maggs & Hurrelmann, 1998), it nonetheless can bear harmful consequences, such as infection with STI and HIV. Prevention researchers have sought to understand the extent to which engaging in sexual activity and substance use in adolescence predicts continued or heightened engagement in these risk behaviors over the life course, particularly in emerging adulthood, a period often characterized by an increase in sexual activity and substance use (Arnett, 2000, 2005; Schulenberg et al., 2005). The hypothesis that STI/HIV risk behaviors in adolescence positively predicted STI/HIV risk behaviors in emerging adulthood was supported and several interesting implications emerged from the analyses.

First, findings lend support to previous research showing that sexual risk behaviors increase through adolescence and into the transition to emerging adulthood (Arnett, 2000, 2005; Duncan et al., 1999; Schulenberg et al., 2005). However, with only a few exceptions (Beadnell et al., 2005; Duncan et al., 1999; Halpern et al., 2004; Susser et al., 1998), most studies investigating young people's risk for STI/HIV have examined engagement in single sexual behaviors. For example, studies have looked at the rates of condom use, or the number of lifetime sexual partners. This approach has drawbacks since examining each indicator for sexual activity separately can falsely represent the risk for STI/HIV transmission (Beadnell et al., 2005). For example, having unprotected sexual activity with one partner may carry a different risk of infection than having unprotected sexual activity with many partners. In addition, adolescents tend to vary their safe sex behaviors depending on the type of partners they have (e.g., they will not use condoms if they have one main partner, whereas they will use condoms if they have casual partners) (L. J. Bauman & Berman, 2005; Rosengard et al., 2005).

Looking at single indictors for sexual risk behaviors is even more concerning when assessing the risk for STI/HIV between adolescence and emerging adulthood. During this period, many adolescents transition into romantic relationships and, especially for older adolescents, experience longer-term relationships (L. J. Bauman & Berman, 2005; Carver et al., 2003). A study by Carver et al. (2003) investigating romantic relationships in adolescence using Wave I data from the National Longitudinal Study of Adolescent Health concluded that relationship stability increased with age

110

among adolescents for both males and females. National estimates showed that the median duration of romantic relationships among US adolescents was about 14 months, with males listing relationships that are shorter in duration than females (12 months compared to 16 months). This mean varied with age: the duration of a relationship was on average 5 months for adolescents less than 14 years, 8 months for adolescents aged 14-15; and 21 months (almost 2 years) for adolescents 16 and older (Carver et al., 2003). Given the changes in romantic relationships during adolescence, the sexual behavior of young people also changes during this period. For example, adolescents may switch from condom use to another contraceptive when settling into a steady relationship. In this situation, looking at only condom use as an indicator of risk for STI/HIV may erroneously inflate these individuals' risk.

This study considered a multidimensional approach to the risk for STI/HIV and measured respondents' engagement in several behaviors shown to increase the risk of transmission of STIs and HIV. The following behaviors were combined to create a scale to measure adolescents' and emerging adults' risk for STI/HIV: sexual activity, number of sexual partners, condom use, MSM, the exchange of sex for drugs or money, and injection drug use. Although the last 3 behaviors are less prevalent among adolescents, they are associated with an increased risk for STI/HIV transmission (Centers for Disease Control and Prevention, 2005; Santibanez et al., 2006; The National Center on Addiction and Substance Abuse at Columbia University, 1999) and therefore, including them in the scale was important to get a comprehensive assessment of adolescents' risk for STI/HIV. As mentioned previously, the scale has been tested for validity. At Wave III of Add Health, biological samples were drawn from respondents to test for the presence of STIs (chlamydia, gonorrhea and syphilis); it was then possible to compare the mean numbers of STI/HIV risk behaviors (Wave III) between adolescents who tested positive for any STI and those who did not. Respondents who tested positive to at least one of the three STIs had a significantly higher mean on the STI/HIV risk behaviors scale than those who did not test positive on any STI.

Given that the analyses for this first aim focused on a subset of Add Health, more research is needed to further replicate this study's findings regarding the relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood (for example, conduct the analysis on the core Waves I and III Add Health sample, rather than just the sub-sample of saturation schools).

Another important finding stemming from Aim I was that although STI/HIV risk behaviors in adolescence predicted STI/HIV risk behaviors in emerging adulthood, the relationship between risk behaviors in these life stages was weak (b=0.13). Comparing two adolescents with different values for STI/HIV risk behaviors, but who are similar on all the control variables, is a useful illustration of the strength of this relationship. For example, using the coefficients from table V.15 and assigning specific values for the covariates will yield the following: a Black female aged 15 years, who is involved in a romantic relationship, who never attends religious services, whose parents are college graduates and whose closeness to her parents approximates the average for the group will have a score of 4.9 for her STI/HIV risk behaviors in emerging adulthood, *if her score for STI/HIV risk behaviors in adolescence was 1*. Another female with similar characteristics, but *with a score of 7 for STI/HIV risk behaviors in adolescence* will have a score of 5.7 for STI/HIV risk behaviors in emerging adulthood. The range for STI/HIV risk behaviors in adolescence was 0 to 8, and that for STI/HIV risk behaviors in emerging adulthood was 0 to 7. Thus, although previous behavior had been posited to influence future behavior, this study indicates that this influence, when considering STI/HIV risk behaviors, is modest.

Previous research has suggested that the development of risk behaviors in adolescence and young adulthood can follow multiple paths (e.g., adolescents may consistently exhibit low-risk behaviors or high-risk ones, or change their level of risk) (Arnett, 2000; Schulenberg et al., 2005; Sroufe, 1997), and that individuals have the ability to change from one pathway to another (Lerner et al., 2005; Sroufe, 1997; Steinberg & Lerner, 2004). This study reinforces this suggestion and indicates that factors beyond engagement in STI/HIV risk behaviors in adolescence shape individuals' STI/HIV risk behaviors in emerging adulthood. Future research could investigate

112

whether some of these factors may include events that accompany the transition to emerging

adulthood, such as the transition to marriage or moving to college (Arnett, 2000). Moving to college,

for example, constitutes for most emerging adults the first time they will be away from their families,

and therefore, from any close parental supervision, thus providing them with a newfound freedom to

engage in sexual risk behaviors and substance use (Arnett, 2000).

VI.1.1.2. Gender and racial differences (RQ2)
<u>Gender differences</u>

Hypothesis 2.1 examined whether the relationship between STI/HIV risk behaviors in

adolescence and in emerging adulthood varied by gender, and is based on previous research

suggesting that males are more likely than females to engage in risky substance use and sexual

behavior (Courtenay et al., 2002; Halpern et al., 2004; Schulenberg et al., 1996) and are more likely

to escalate their risky substance use over time (Chassin et al., 2002; Ellickson et al., 2004; Harris et

al., 2006; Schulenberg et al., 1996). For example, Harris and colleagues' (2006) analysis of gender

differences in the changes in selected risk behaviors between adolescence and emerging adulthood

indicated that males experienced a greater increase in risk behaviors such as marijuana and drug use

than females. Hypothesis 2.1, suggesting that gender moderates the relationship between STI/HIV

risk behaviors in adolescence and those in emerging adulthood, was not supported. Findings

indicated that the relationship between STI/HIV risk behaviors in adolescence and in emerging

adulthood was similar for males and females. Findings further showed that gender did not predict

STI/HIV risk behaviors in emerging adulthood, controlling for STI/HIV risk behaviors in

adolescence.

A possible explanation for the finding that gender did not moderate the relationship between

STI/HIV risk behaviors in adolescence and those in emerging adulthood could be that there truly is no

difference between males and females in this relationship. Most research on gender differences in

adolescent risk behaviors and STI/HIV infection is cross-sectional (Centers for Disease Control and

Prevention, 2004; Weden & Zabin, 2005). Studies examining gender differences in changes in risk

behaviors between adolescence and young adulthood have mostly focused on changes in substance use (Chassin et al., 2002; Harris et al., 2006; Schulenberg et al., 1996). For example, Harris et al.'s study (2006), using a nationally representative sample of adolescents (Add Health), showed that, for both White and Black adolescents, the increase in daily cigarette use, marijuana use, drug use and binge drinking was greater for males than females. Based on these findings, it was hypothesized that the relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood will be greater for males than females. However, in the present study, this gender difference did not appear for STI/HIV risk behaviors.

A puzzling finding that emerged from these analyses was the difference in the means of STI/HIV risk behaviors in adolescence for males and females, which was contrary to expectation. The mean number of STI/HIV risk behaviors for females was almost twice that for males (1.18 vs. 0.68). Further examination of the gender differences in the sexual behavior and substance use indicators used to create the scale for STI/HIV risk behaviors showed that, at Wave I, significant differences were observed between males and females on 3 out of 5 behaviors (sexual activity, number of sex partners, frequency of condom use), with females reporting higher risk behaviors than males. One possible reason for this finding could be that males who were excluded from the study had higher STI/HIV risk behaviors than the ones included. However, comparison of the means of STI/HIV risk behaviors at Wave III (where missing data was minimal) between the excluded (3.54) and the analytical (3.31) samples did not show any significant differences between the 2 groups.

Another possible explanation for the higher reports of STI/HIV risk behaviors for females could relate to the differences in involvement in romantic relationships in this sample. Fifty-eight percent of respondents reported having experienced a romantic relationship in the 18 months preceding the survey; however, the prevalence of romantic relationships was higher for females (61.29%) as compared to males (52.59%). Involvement in a romantic relationship has been linked to greater sexual risk behavior and substance use, as suggested by Halpern and colleagues (2007). In addition, gender differences in sexual behavior within the context of romantic relationships have been

observed. Carver et al.'s (2003) nationally representative study of the romantic relationships of adolescents noted that, unexpectedly, the prevalence of sexual intercourse within the context of a romantic relationship was higher for females (44.00%) as compared with males (36.80%), a finding supporting previous research that girls are more likely than boys to have intercourse within the context of a relationship (Sprecher et al., 1995).

In addition, recent research examining the sexual relationship patterns of adolescents established an association between the type of sexual relationship they are involved in and condom use, with one study showing that females were more likely than males to have had main partners (as opposed to having casual partners) but less likely to use condoms within the context of a main relationship (Rosengard et al., 2005). A study using nationally representative data also concluded that females who were in sexually active relationships with partners they had not known before the relationship began were less likely to consistently use a form of birth control (Kaestle & Halpern, 2005). The higher prevalence of romantic relationships (and hence sexual activity) among females and their inconsistent use of condoms, coupled with the fact that adolescents in general have inaccurate perceptions of their sex partners' (including the main ones) risk behaviors (Rosengard et al., 2005) suggest that females may indeed be engaged in higher risk STI/HIV risk behaviors.

Racial differences

Hypothesis 2.2 examined whether the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood varied by race. The hypothesis was not verified and findings indicated that the relationship between STI/HIV risk behaviors in adolescence and in emerging adulthood was similar for Blacks and for Whites (i.e., the slopes for Black adolescents were not steeper to indicate a higher increase in STI/HIV risk behaviors for this population). In the first study to explore longitudinal changes in racial and gender disparities in risk behaviors from adolescence to emerging adulthood, Harris and colleagues (2006) had reported that Black adolescents experienced the highest increase in STD diagnosis, as compared with all other racial groups. Unfortunately, no information was reported on specific sexual practices. Based on the results of this study, which used

a nationally representative sample of adolescents (Add Health), I hypothesized that the relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood will be stronger for Black adolescents, to account for their disproportionate increase in STIs.

The lack of support of this hypothesis raises interesting issues concerning the relationship between sexual risk behaviors and the risk for STI/HIV, especially among Blacks. A recent study by Hallfors and colleagues (2007), also using nationally representative data, concluded that, for Black adolescents, STI/HIV risk behaviors did not reflect the risk for STI and HIV. Black adolescents consistently displayed higher rates of STI/HIV, whether they engaged in low or high risk sexual behaviors. The relationship between STI/HIV risk behaviors and the risk for STI and HIV was more linear for White adolescents: their risk for STI/HIV increased as their risk behaviors increased. Therefore, these findings suggest increases in STI between adolescence and emerging adulthood do not necessarily translate into increases in STI/HIV risk behaviors. The relationship between STI/HIV risk behaviors in adolescence and emerging adulthood may be similar for Blacks and Whites and factors beyond those risk behaviors may be contributing to a differential increase in STI between the two racial groups.

VI.1.2. Discussion of findings for Aim II

Multiple linear regression models were used to examine the association between adolescents' STI/HIV risk behaviors and three friendship dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk behaviors; and to investigate gender and racial differences in this relationship. In addition, gender and racial differences in friendship dimensions were examined. Results were as follows: (1) There were no significant interactions between either gender or race with number of friends, emotional and behavioral closeness to friends; (2) Only gender interacted with friends' STI/HIV risk behaviors such that the relationship between friends' STI/HIV risk behaviors and adolescents' STI/HIV risk behaviors was stronger for females than males; (3) Number of friends was positively associated with adolescents' STI/HIV risk behaviors; (4) females adolescents reported

more behavioral closeness to their friends than males; and (5) the mean number of friends' STI/HIV risk behaviors was higher for females than males. In this section, I will discuss each of the above-mentioned results.

VI.1.2.1. The relationship between STI/HIV risk behaviors in adolescence and friendship dimensions (RQ3)

Number of friends; behavioral and emotional closeness to friends

Hypotheses H3.1 and H3.2 suggested that adolescents' STI/HIV risk behaviors were not associated with number of friends, behavioral and emotional closeness to friends whereas hypothesis H3.3 postulated that STI/HIV risk behaviors in adolescence are positively associated with friends' STI/HIV risk behaviors. Findings were in support of H3.1 and 3.3 and add further evidence to recent research showing that the friendships of adolescents with high-risk behaviors share similar characteristics with those of adolescents with less risky behaviors (Giordano et al., 1998; Giordano et al., 1986). This study showed that adolescents with high STI/HIV risk behaviors were as likely as those with lower risk behaviors to spend time with their friends and feel loved by and cared for by their friends. Adolescents and their friends had similar levels of STI/HIV risk behaviors, further attesting to the homogeneity of adolescents' peer groups (Ennett et al., 1994).

However, the finding that the number of friends was negatively associated with adolescents' STI/HIV risk behaviors was contrary to hypothesis 3.1 and indicated that adolescents with high STI/HIV risk behaviors had fewer friends than those with low STI/HIV risk behaviors. This finding was not verified when assessing the relationship between STI/HIV risk behaviors in adolescence and total number of friends (as opposed to just the number of friends who are included in Add Health) (results not shown), thereby supporting the assertion of no difference in the friendships of adolescents with varying levels of risk.

117

VI.1.2.2. Gender and racial differences in the relationship between STI/HIV risk behaviors in adolescence and friendship dimensions (RQ4)

Hypotheses H4.1- H4.3 postulated that the relationship between friendship dimensions and adolescents' STI/HIV risk behaviors did not vary by gender or race. Hypotheses H4.1 and H4.2 were fully supported whereas hypothesis H4.3 was only partially supported since the relationship between friends' STI/HIV risk behaviors and adolescents' behaviors was stronger for females as compared with males. Some studies have suggested that females are more influenced by their friends' behaviors than males (Billy & Udry, 1985; Jaccard et al., 2005) because of a greater intimacy and closeness in their relationships. The analysis for this hypothesis, however, was cross-sectional, thereby precluding any conclusive inference as to whether the adolescent females have chosen friends with similar STI/HIV risk behaviors or whether they were influenced by their friends' behavior.

VI.1.2.3. Gender and racial differences in friendship dimensions (RQ5)

Contrary to expectation, hypotheses H5.1 and H5.2 were not supported and no racial differences in the number of friends and emotional and behavioral closeness to friends were reported. Similarly, no racial differences in the mean levels of friends' STI/HIV risk behaviors were observed, but this finding was in support of hypothesis H5.3. Racial differences in the number of friends and emotional and behavioral closeness to friends were expected because the few studies that have examined friendships of minority adolescents suggested that there are significant racial differences in the quality and characteristics of their friendships (Way & Chen, 2000; Way et al., 2001). Recent studies have reported that Blacks are actually less susceptible to peer influence than Whites, especially with respect to risk behaviors, including sexual activity (Billy & Udry, 1985; Cavanagh, 2004; Giordano, 2003; Giordano et al., 1993; Udry & Billy, 1987). These studies have also reported that Blacks are less close to their friends than White adolescents (Giordano et al., 1993; Larson et al., 2001). One reason for not detecting any racial differences could relate to the sample size differences between Black and White adolescents: Black adolescents constituted only 6% of the study's sample. However, the absence of racial differences in number of friends and emotional and behavioral

closeness to friends could also indicate that Black and White adolescents share similar friendship characteristics. Two antagonistic conceptual perspectives have been proposed to characterize the friendships of Black adolescents: One perspective suggests that Black adolescents are more peer-oriented than Whites to compensate for assumed deficits in the family [the "compensation argument" e.g., Silverstein and Krate, in (Giordano et al., 1993)]; another perspective suggests that Black adolescents, on the contrary, are less close to their friends and rate having close friends as less important than White adolescents (Giordano et al., 1993; Larson et al., 2001). However, the divergent findings could be due to the different samples used in these studies and therefore more research is needed to gain a better understanding of the friendships of Black adolescents.

Hypothesis H5.4 was supported and, as expected, the number of friends did not differ by gender. Similarly, no gender differences were observed in emotional closeness to friends, a finding contrary to hypothesis H5.5. Emotional closeness to friends has been defined as feeling loved by friends (Aron et al., 1992) and was expected to be higher for females than males. Previous research has suggested that emotional closeness is a "female-oriented" definition of closeness and that its frequent use as an indicator of closeness has resulted in an underestimation of closeness among males (Camarena et al., 1990). However, this study shows that males and females experience similar levels of emotional closeness. This finding could result from the fact that emotional closeness was measured in relation to the peer group, as opposed to one friend. It could be that emotional closeness (i.e., reciprocated friendships) is higher among females than males when considering dyads (e.g., respondent and their best friend) but not when considering the peer group.

Hypothesis H5.6 was not supported and females reported more behavioral closeness to their friends than males. A possible reason for this finding could relate to the measurement of behavioral closeness in this study. Behavioral closeness has been defined as the frequent engagement in shared activities (Aron et al., 1992). In this study, behavioral closeness was measured as adolescents' engagement in the following activities in the week preceding the survey: they had gone to a friend's house, hung out with him or her after school, talked with him or her on the telephone, talked about a

119

problem, and whether they spent time with this friend in the past week-end. However, studies have shown that behavioral closeness among males is best achieved when they engage in shared activities and structured games whereas girls generally spend more time with their friends (Cavanagh, 2004; McNelles & Connolly, 1999; Roy et al., 2000; Youniss & Haynie, 1992). Behavioral closeness as measured in this study is a reflection of time spent together, rather than involvement in specific activities; it was therefore more appropriate to capture behavioral closeness among females and it may be the reason why females scored higher than males on behavioral closeness.

Hypothesis H5.7 was not supported; the mean level of friends' STI/HIV risk behaviors was higher for females than males. This finding could be explained by the generally high levels of STI/HIV risk behaviors among the females in this sample.

VI.1.3. Discussion of findings for Aim III

Multiple linear regression models were used to address the third aim of this study. I examined whether friends' STI/HIV risk behaviors moderated the relationship between friendship dimensions (number of friends, behavioral and emotional closeness to friends) and STI/HIV risk behaviors in emerging adulthood, controlling for baseline STI/HIV risk behaviors. I also examined whether the proposed model differed by gender and race. There were no significant interactions between friends' STI/HIV risk behaviors and number of friends, behavioral or emotional closeness to friends. However, there was a significant positive association between behavioral closeness to friends and STI/HIV risk behaviors in emerging adulthood. The proposed model was not significantly different for males and females, nor for Black and White adolescents. In this section, I will first discuss the findings related to the interaction between friends' STI/HIV risk behaviors and number of friends, emotional and behavioral closeness to friends (RQ 6 & 7). I will then discuss the main effects of behavioral closeness to friends, and will conclude with a discussion of the findings related to gender and racial differences (RQ8).

VI.1.3.1. Interactions between friends' STI/HIV risk behaviors and friendship dimensions (RQ 6 & 7)

Summary of the rationale for the interaction

Hypotheses 6.1, 7.1 and 7.2 examined whether friends' STI/HIV risk behaviors moderated the relationship between number of friends, emotional and behavioral closeness to friends, and emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk behaviors. These hypotheses are based on empirical and theoretical evidence suggesting that friendships in adolescence may be linked to outcomes in emerging adulthood. Studies on adolescent peer relationships have shown that friendship quality and quantity, and friends' risk behaviors, when examined separately, are associated with the quality of emerging adults' interpersonal relations (Capaldi et al., 2001; Giordano et al., 1998), reproductive health outcomes such as number of sexual partners and adolescent childbearing (Feldman et al., 1995; Underwood et al., 1996), and substance use (Andrews et al., 2002; Chassin et al., 2002; Duncan et al., 1998; Griffin et al., 2002). Developmental theories also point to a relationship between adolescent friendships and emerging adults' substance use and sexual behavior risk profiles. In particular, Sroufe's organizational-developmental theory (Roisman et al., 2004; Sroufe, 1979) and Collins' developmental perspective on relationships (W. A. Collins, 1997), suggest that individuals' past circumstances bear an impact on their present and future, and that relationship experiences are crucial for normative developmental processes (W. A. Collins, 1997; Crosnoe, 2000; Giordano et al., 1998; Hartup, 1989; Hartup et al., 1993; Hartup & Stevens, 1997; Roisman et al., 2004; Sroufe, 1997).

While much of the developmental research portrays friendships as positive, and views the ability to make friends and establish close relationships with them as having positive long-term effects (Hartup & Stevens, 1997; Sroufe, 1979, 1997), the majority of public health research on friends has focused on the negative influence of friends' risk behavior. However, I hypothesized that considering simultaneously friendship dimensions and friends' risk behavior is important to predict the effect of friendships on adolescent and emerging adult STI/HIV risk behaviors. In fact, primary

socialization theory proposes that the characteristics of the friendship and that of the friends interact to influence adolescent outcomes. Therefore, I proposed considering primary socialization theory in conjunction with two developmental theories to create an appropriate framework to examine the influence of adolescent friendships on STI/HIV risk behaviors. Hypotheses 6.1, 7.1 and 7.2 were not supported by the study findings as none of the interactions between friends' STI/HIV risk behaviors and number of friends, emotional and behavioral closeness to friends was statistically significant.

The finding of the non-moderating effect of friends' STI/HIV risk behaviors was therefore surprising, given the theoretical and empirical rationales justifying the usefulness of considering the interactions between friendship dimensions. The absence of interaction between friends' STI/HIV risk behaviors and number of friends, behavioral and emotional closeness to friends indicates that these friendship dimensions as measured in this study do not necessarily need to be considered in conjunction with friends' STI/HIV risk behaviors to predict STI/HIV risk behaviors in emerging adulthood. As detailed below, there could be multiple reasons for the absence of interaction effects.

Potential reasons for the absence of a moderation effect by friends' STI/HIV risk behaviors

First, the absence of an interaction effect between friends' STI/HIV risk behaviors and friendship dimensions could suggest that the long-term effects of adolescent friendships may truly not be dependent on the friends' characteristics. The developmental theories (Sroufe's organizational developmental theory and Collins' developmental perspective on relationships) guiding this study suggest that having friends and establishing close friendships, which are key developmental tasks in adolescence, are necessary for positive development irrespective of who the friends are. However, while this assertion has support when considering the relationship between adolescent friendships and psychosocial outcomes in adulthood such as the quality of interpersonal relationships, self-esteem or mental health status such as depression (Bohrnstedt & Fisher, 1986; Kupersmidt & Coie, 1990; Parker & Asher, 1987), results are more mixed when considering behavioral outcomes such as sexual activity and substance use. The mixed findings regarding the associations between adolescent friendships and substance use and sexual behavior outcomes in adulthood could be an indication that

122

these friendships, which were considered separately in the different longitudinal studies, do, in fact, interact. The results of this study were, however, contrary to expectation: no interactions between friendship dimensions and friends' STI/HIV risk behaviors were observed. Given the scarce research on the relationship between adolescent friendships and emerging adults' substance use and sexual behaviors, more research is needed to replicate this study's findings.

Second, a potential interaction between friends' behaviors and number of friends and closeness to friends may be behavior-specific. Research has shown that the influence of friends' behavior on adolescents' own behavior is likely to vary across behaviors (Maxwell, 2002). For example, Maxwell's (2002) investigation of the role of the influence of one same-sex friend across five risk behaviors (cigarette smoking, alcohol consumption, marijuana use, tobacco chewing, and sexual debut) showed that the peer influence was highest for chewing tobacco (log odds= 2.14) and lowest for marijuana use (log odds=1.58). Interestingly, the peer influence on sexual debut was relatively high (2.08). Jaccard and Blanton (2005) reported a similar finding. The influence of respondents' closest friend was slightly higher for sexual debut than binge drinking, although the influence was generally small for both behaviors. However, findings from these studies regarding the peer influence on sexual debut are not necessarily indicative of the extent of friends' influence on STI/HIV risk behaviors because the STI/HIV risk behaviors for this study are a scale including the following behaviors: having had sex, number of sexual partners, frequency of condom use, sex in exchange for money, injection drug use and men having sex with men. It has been suggested that peer influence may vary depending on the behaviors' social context, with the influence being stronger for behaviors that are more social and group-based, thereby providing an opportunity for the behaviors to be affected by group norms (Maxwell, 2002). The STI/HIV risk behaviors as measured in this study do not occur and are not generally discussed in groups (more likely with best friends). Therefore, if adolescents are less influenced by their friends' STI/HIV risk behaviors, this latter variable will not act as a moderator and the effect of closeness to friends on adolescents' own behavior will not be dependent on whether the friends engage in high or low STI/HIV risk behaviors.

Third, a lack of variability in the moderator variable may explain the absence of an observed interaction effect between the friendship dimensions and friends' STI/HIV risk behaviors. In this study, the mean level of friends' STI/HIV risk behaviors was 1.18 (scale ranging from 0 to 7), thus suggesting that, for most adolescents, the majority of their close friends only engaged in minimal risk behaviors. The limited range of the moderator variable (friends' STI/HIV risk behaviors) hence would make it difficult to detect differences in the relationship between the predictors (number of friends, emotional and behavioral closeness to friends) and the outcome (emerging adults' STI/HIV risk behaviors) variables across different ranges of the moderator.

A fourth reason for the absence of an interaction between the friendship variables and friends' behavior may suggest that the number, closeness and behaviors of a group of friends are not as essential to predict young people's behavior as the closeness and behaviors of one particular friend (usually the closest or "best" friend). Studies have shown that the influence of one friend as compared to the influence of a group of friends may vary depending on the behavior under consideration. For example, Urberg et al. (1997) compared the relative influence of adolescents' closest friends and that of their friendship group on their cigarette smoking and alcohol use. Results indicated that the *close friends* predicted initiation of cigarette and alcohol use and the transition to current use for alcohol. The *friendship group* predicted adolescents' transition into current cigarette use. Both the friendship group and the close friend predicted adolescents' drinking to intoxication. The differential effect of a close friend as compared to the friendship group could relate to the nature of the behaviors. For behaviors that are illegal such as cigarette and alcohol use, adolescents may be more willing to approach a close friend for a cigarette or a drink than anyone else (Urberg et al., 1997). No similar comparative study exists for STI/HIV risk behaviors or sexual behaviors. However, as discussed previously, STI/HIV risk behaviors are more likely to be discussed within close friendship dyads. Therefore, future research should investigate the interactions at the level of the best friend (e.g., closeness to best friend * STI/HIV risk behaviors of that friend).

Finally, the absence of an interaction effect may relate to the operationalization of the study variables, specifically closeness to friends. Primary socialization theory posits that bonds between youth and each of the primary socializing agents (family, school, peers) are used to communicate norms, and that the likelihood that adolescents will imitate the behavior of their peers (whether prosocial or deviant) depends on the strength of their bond with them (Oetting & Donnermeyer, 1998). However, the authors do not further elaborate on what exactly constitutes a "bond," except that "bonds" are connections between the adolescents and their primary socializing agents. For this study, bond refers to the quality of the friendship, and specifically to the closeness between the adolescents and their peer group. However, friendship quality is a multidimensional construct that encompasses several elements including *normative functions* (activities friends engage in), *constructiveness* (how they resolve conflicts), *closeness* (how much time they spend together and how many activities they engage in), *symmetry* (balance of power in the relationship), and *affective character* (if friendships are supportive) (Hartup & Stevens, 1997). For this study, only the "closeness" dimension of friendship quality was used. In summary then, two potential issues in measurement might account for the lack of verification of primary socialization theory's premise of an interaction between friendship "bonds" and friends' characteristics: (1) friendship quality may not have been an adequate operationalization of the "bond" between adolescents and their friends; or (2) the "closeness" aspect of friendship quality may not have been enough to capture the true definition of friendship quality. A more comprehensive definition of friendship quality that would capture the multidimensional nature of his construct might have been needed. This could be achieved by creating an aggregate of the different elements that constitute friendship quality.

VI.1.3.2. Main effects of friends' STI/HIV risk behaviors and friendship dimensions
Although behavioral closeness to friends did not interact with friends' STI/HIV risk behaviors, it predicted emerging adults' STI/HIV risk behaviors: adolescents who were behaviorally closer to their friends engaged in more STI/HIV risk behaviors in emerging adulthood. This finding is contradictory to developmental theories' postulate that having friends and forming high-quality

125

friendships are crucial for positive adolescent development. It is, however, in line with propositions from primary socialization theory (Oetting & Donnermeyer, 1998) and social control theory (Hirschi, 1969) which state that interacting with friends may have a detrimental impact on adolescents' behavior. While these theories suggest that friends may have a negative influence on adolescents, this study further demonstrates that the effects resulting from these exchanges may extend well beyond the adolescent years.

Possible mechanisms that could explain the link between adolescent friendships and emerging adults' sexual risk behaviors have been explored. Research suggests that higher quality friendships in adolescence influence adolescents' dating behavior and alcohol use, which are then linked to sexual risk behavior. For example, Zimmer-Gembeck and colleagues (2004), in an exploration of the developmental pathways to sexual behavior at age 19, concluded that higher quality friendships in early adolescence predicted early initiation of romantic relationships, which, in turn, predicted having a higher number of lifetime sexual partners by age 19. The relationship between early initiation of romantic relationships and the number of lifetime sexual partners was mediated by alcohol use. Similarly, Feldman and colleagues (1995) demonstrated a link between peer acceptance (an indicator of friendship quantity), dating behavior, alcohol use and the number of sexual partners. Their study, which explored the long-term influences of peer relationships in early adolescence, showed that peer relationships in 6th grade predicted sexual experience in 10th grade. Specifically, Feldman and colleagues (1995) demonstrated that boys who were popular in elementary schools (an indicator of friendship quantity) were more likely to date extensively in adolescence and to drink alcohol at parties and other gatherings. Dating and alcohol provided greater opportunities for sexual intercourse with multiple partners.

The positive relationship between behavioral closeness to friends and STI/HIV risk behaviors in emerging adulthood could also relate to the measurement of the outcome. The scale for STI/HIV risk behaviors consists of 6 items relating to sexual behavior and IV drug use. However, very few adolescents engaged in behaviors such as the exchange of sex for drugs or money, IV drug use or

126

MSM, and the greatest contribution to the scale came from the measures on sexual activity, multiple partners and condom use. However collapsing the response options for the last two items into just three categories may have reduced the scale's capability of detecting a wide variation in risk. As such, the scale could have been a reflection of more normative sexual behaviors. As a result, and based on the mechanisms outlined in the previous paragraph, a higher behavioral closeness to friends could translate into more opportunities for sexual activity.

In this study, friends' STI/HIV risk behaviors in adolescence did not have a long-term influence on emerging adults' STI/HIV risk behaviors. Previous research examining the long-term influence of friends' risk behaviors in adolescence have resulted in mixed findings. While some studies have shown that friends' risk behavior in adolescence influences emerging adults' own behavior, especially with respect to substance use (Andrews et al., 2002; Chassin et al., 2002; Duncan et al., 1998; Griffin et al., 2002), others have failed to support this association (Bates & Labouvie, 1997; Engels et al., 1999; Oygard et al., 1995; West et al., 1999). Reasons for the mixed findings regarding the long-term effects of friends' risk behaviors in adolescence could relate to the confounding of influence with selection and projection effects.

It should be noted that previous research has overstated the effect of the influence of friends' behavior on adolescents' behaviors (K. E. Bauman & Ennett, 1996). Aside from influence, similarities between adolescents' behaviors and their friends' behaviors could be a result of selection (adolescents choosing friends with similar characteristics) or projection effects (adolescents' projecting their own behavior on their friends) (K. E. Bauman & Ennett, 1996; Norton et al., 2003), that are not accounted for in many studies (the use of a cross-sectional design that confounds selection and influence effects). In this study, selection and projection effects were minimized by choosing a longitudinal design that allowed the measurement of friends' and adolescents' STI/HIV risk behaviors at two different time points (Waves I & III) (minimize selection effects), and by using friends' own reports of their behaviors rather the adolescents' perceptions of their friends' behaviors (minimize projection effects).

The lack of an association between number of friends in adolescence and STI/HIV risk behaviors in emerging adulthood was somewhat surprising. However, researchers had already shown that the quality of the friendship was a better predictor of adolescent outcomes than the number of friends an individual has (Hartup & Stevens, 1997; Hussong, 2000). This study further demonstrated that long-term effects of adolescent friendships were more a function of the quality of the friendship rather than the quantity.

Finally, behavioral closeness to friends in adolescence appeared to be the most influential determinant of STI/HIV risk behaviors in emerging adulthood, although the relationship was not very strong. In this study, the behavioral closeness to friends tapped into general activities adolescents might engage in, such as hanging out after school or talking on the phone. It did not measure engagement in deviant activities together. The findings therefore indicate that general closeness to friends in adolescence (as opposed to closeness specifically resulting from sharing risky or deviant activities) is predictive of higher STI/HIV risk behaviors in emerging adulthood. However, findings also show that friends' STI/HIV risk behaviors in adolescence are positively associated with adolescents' STI/HIV risk behaviors (see Aim II). Therefore, adolescents with high STI/HIV risk behaviors are most likely spending time with and are close to adolescents with similarly high-risk behaviors. The content of these exchanges is not clear. For example, we know that adolescents may have spent time with their friends after school or during the week-end (these are two of the statements used to measure behavioral closeness), but we do not know what they actually did together. However, research has shown that grouping youth with high-risk behaviors together may have a negative effect on them. An evaluation of a peer group intervention for at-risk high school youth has shown that clustering high-risk youth in preventive interventions ultimately has detrimental effects (Cho et al., 2005). More information on the types of activities adolescents engage in with their friends would therefore better our understanding of the relationship between behavioral closeness to friends and STI/HIV risk behaviors in emerging adulthood.

VI.1.3.3. Gender and racial differences

Hypotheses H8.1 and H8.2 postulated that the proposed model examining the effect of adolescent friendships on emerging adults' STI/HIV risk behaviors was similar for males and females, and for Black and White adolescents. Findings were in support of both hypotheses and no differences by gender or racial group were noted. These findings are in support of previous research suggesting that differences in outcomes among racial groups and gender are more likely due to differences in antecedents (which for this study include friendship dimensions) rather than to differences in developmental pathways (Goldstein et al., 2005; Laird et al., ; Pilgrim et al., 2006; Rowe et al., 1994).

VI.2. Strengths and limitations

VI.2.1. Limitations

Number of nominated friends included in Add Health vs. those who are not: Add Health respondents in the saturation sample were given the opportunity to list up to 5 male and 5 female friends. Those friends who attended either the same school as the respondent or the sister-school, and who could be located on the school roster, were interviewed. The probability of having their friends interviewed was higher for adolescents in the saturation sample given that: (1) all students in the schools forming the saturation sample were selected for the study; and (2) adolescents' friends generally attend the same school as the adolescent. In this study, the mean number of total nominated friends was 6. Of those, 4 were included in Add Health and 2 were not. All analyses were performed on the friends who were included in Add Health because of the study's reliance on adolescents' self-reports of behavior and the computation of reciprocated friendships. It is not known whether this strategy excluded friends who have riskier STI/HIV risk behaviors than the friends included in the study, and whether the respondents' closeness to their excluded friends is different than their closeness to the friends included in the study.

Missing cases for STI/HIV risk behaviors: A large number of missing cases were noted for the measure of STI/HIV risk behaviors in adolescence (Wave I). As mentioned previously, the

STI/HIV risk behaviors variable in adolescence was computed as the sum of the following sexual behavior measures and IV drug use (at Wave I): Ever had sex, number of sexual partners (ever), frequency of condom use (ever), exchange of sex for drugs/money (ever), IV drug use (ever) and MSM. Of these variables, MSM contributed the most missing cases to the overall STI/HIV risk behaviors variable (250 missing cases, or 73% of the total 341 cases missing for STI/HIV risk behaviors). The MSM variable was, in turn, computed from 18 variables, 6 of which had a large number of missing cases. The sample with missing values for STI/HIV risk behaviors was more likely to be male, Black (only borderline significance) and older, thereby limiting the generalizability of the study findings.

Racial composition of the sample: White adolescents were disproportionately represented in the study. A comparison of the schools in the saturation sample to the general Add Health sample (Table IV.1) showed that the saturation sample was more likely to include White adolescents, as compared to other racial groups. The number of Black adolescents was further restricted by the greater exclusion of Black adolescents as compared with Whites because of missing cases on STI/HIV risk behaviors in adolescence. This difference in sample size between Black and White adolescents could have made it difficult to detect any racial differences suggested by the study hypotheses. In addition, Black adolescents who were excluded from the study may have riskier STI/HIV risk behaviors than the ones included.

Measure of closeness: In this study, closeness to friends was used as a measure of friendship quality. However friendship quality includes several other dimensions such as normative functions, constructiveness, closeness, symmetry, and affective character (Hartup & Stevens, 1997). A more comprehensive definition of friendship quality that would capture the multidimensional nature of his construct might have been needed.

VI.2.2. Strengths

Integration of different measures of friendships: One important contribution of this study is its simultaneous consideration of different friendship dimensions to better understand the effect of adolescent friendships on STI/HIV risk behaviors in emerging adulthood. Specifically, this is one of the few studies that has examined the interaction between characteristics of the friendship (number of friends, emotional and behavioral closeness to friends) and the characteristics of the friends (friends' STI/HIV risk behaviors) to predict respondents' behavior. Several researchers have suggested that accounting for this interaction is essential to get an accurate assessment of the effects of any friendship dimension on adolescent behavior (Berndt & Murphy, 2002; Hartup, 1996; Oetting & Donnermeyer, 1998).

Use of friends' self-reports of behavior: This study's use of friends' self-reports of behavior to create the friends' STI/HIV risk behaviors scale is another important contribution. Studies on adolescent friendships have generally relied on adolescents' *perceptions* of their friends' behavior to predict the effect of friends' behavior on adolescents' own behavior. However, adolescents' perceptions of their friends' behaviors are often not a good proxy for the actual behavior of the friends since adolescents may project their own behavior on their friends (K. E. Bauman & Ennett, 1996). This projection effect often results in an overestimation of the relationship between friends' and adolescents' behaviors.

Use of a scale to measure STI/HIV risk behaviors: This study is also one of the few to compute a composite measure to assess adolescents' and emerging adults' risk for STI/HIV. The study used a multidimensional approach to assess the risk for STI/HIV and measured respondents' engagement in several behaviors shown to increase the risk of transmission of STIs and HIV. As discussed previously, looking at single behaviors to measure young people's risk for STI/HIV might generate misleading conclusions regarding their actual risk. This is especially true when examining STI/HIV risk behaviors between adolescence and emerging adulthood, a period characterized by great changes in the sexual behaviors of young people.

VI.3. Implications

VI.3.1. Theoretical and conceptual implications

Joint consideration of developmental and public health theories for STI/HIV prevention: This study combined developmental (importance of friendship quantity and quality on adolescent development) and public health (importance of friends' behaviors on adolescent outcomes) perspectives to examine the effects of adolescent friendships on emerging adults' STI/HIV risk behaviors. Traditionally, these two lines of research have rarely converged and researchers interested in the influence of friends on adolescents' behavior have seldom accounted for the quality of adolescents friendships. Conversely, researchers interested in the influence of friendship quality have rarely examined the characteristics and behaviors of adolescents' friends. The main tenet of this study, that friendship quality (closeness to friends) and friendship quantity (number of friends) interact with friends' behavior (friends' STI/HIV risk behaviors) to predict emerging adults' STI/HIV risk behaviors, was not supported. Several reasons could account for that, including the measurement of the constructs (e.g., use of indicators other than closeness to capture friendship quality), the limited variability in the moderator variable (55% of adolescents had friendship groups who did not engage in any STI/HIV risk behaviors), or the level of measurement of the friendship variables (group-level friendship measures as opposed to adolescent-best friend dyads). Interactions between friendship and friends' characteristics, and the effect of these interactions on adolescents' behaviors have seldom been examined, and this research is even more scant with respect to STI/HIV risk behaviors. It may therefore be too early to dismiss the usefulness of examining the long-term effects of these interactions, based on the study findings. Further research is needed to explore the reasons behind the absence of an interaction effect, or to replicate the study's findings.

Long-term influences of adolescent friendships on STI/HIV risk behaviors: Of all the friendship dimensions examined in this study, including friendship quantity (number of friends), friendship quality (emotional and behavioral closeness to friends) and friends' behavior (friends' STI/HIV risk behaviors), only behavioral closeness to friends had a significant direct effect on

emerging adults' STI/HIV risk behaviors. Although the association between behavioral closeness to

friends and emerging adults' STI/HIV risk behaviors was not very strong, it was still stronger than the

relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood. These

findings imply that there is a need to further understand the nature of these social interactions (e.g.,

what adolescents and their friends actually do when they hang out, what they talk about) and the

mechanism through which involvement with friends exerts a long-term effect. Primary Socialization

Theory suggests that (1) adolescents are more likely to engage in deviant behavior if their friends are

engaged in deviant behaviors, because peer groups can transmit deviant norms; and that (2) the

likelihood that adolescents will imitate the behavior of their peers (whether prosocial or deviant)

depends on the strength of their bond with them. Further insight into the nature of the social

interactions between adolescents and their friends would provide information about the norms of the

friendship groups adolescents are embedded in, that may explain the long-term influence of closeness

to friends.

VI.3.2. Methodological implications

STI/HIV risk behaviors scale: The composite scale created for measuring STI/HIV risk

behaviors proved to be a valid measure since respondents who tested positive on the biological tests

for STI/HIV had significantly higher STI/HIV risk behaviors than those who tested negative.

However, it was not possible to determine directly which combination of behaviors each respondent

engaged in. For example, 2 respondents with similar scores on the STI/HIV risk behaviors scale

could have had very different sexual behavior patterns, such that one adolescent scored high because

of inconsistent condom use whereas the other scored high because of involvement with multiple

sexual partners. As mentioned in the discussion for aim I, the STI/HIV risk behaviors of adolescents,

specifically the sexual behaviors, vary during the transition to emerging adulthood. There is therefore

a need to better understand the patterns of STI/HIV risk behaviors they engage in at every life stage.

VI.3.3. Practical implications

Effects of friendship quantity and quality: This study showed that the number of friends did not have any long-term effects on STI/HIV risk behaviors in emerging adulthood, and it was negatively associated with STI/HIV risk behaviors in adolescence (adolescents with more friends had lower STI/HIV risk behaviors). The study also showed that closeness to friends was not a very strong predictor of STI/HIV risk behaviors in emerging adulthood. Taken together, these findings suggest that friendships may not be as detrimental to adolescents' and emerging adults' STI/HIV risk behaviors as generally portrayed in the public health literature. In fact, the long-term benefits conferred by adolescent friendships in the psychosocial domain (as suggested by the developmental theories) may outweigh any potential drawbacks they have on the behavioral outcomes. Therefore, interventions to reduce STI/HIV risk behaviors among young people would probably need to acknowledge that friendships may not be the most important influence on these young people's STI/HIV risk behaviors. In fact, many of the control variables, especially involvement in romantic relationships, had stronger associations with the outcome than behavioral closeness to friends. This finding is in line with recent research suggesting that involvement in romantic relationships is associated with higher risk behaviors (Halpern et al., 2007). However, as Collins (2003) argues, other features of the romantic experience, beyond just involvement in a romantic relationship, are potentially more informative regarding the association between romantic relationships and risk behaviors. These features include the identity of the romantic partner, the content and the quality of the relationship. Therefore, interventions to mitigate the development of STI/HIV risk behaviors need to address the multiple facets of adolescents' romantic relationships.

Relationship between STI/HIV risk behaviors in adolescence and emerging adulthood: STI/HIV risk behaviors in adolescence predicted STI/HIV risk behaviors in emerging adulthood. However, compared to the other predictors under investigation, they had a weaker association with STI/HIV risk behaviors in emerging adulthood (see Table V.20). These findings suggest that: (1) interventions to address STI/HIV risk behaviors in adolescence are useful, since decreasing

adolescents' involvement in STI/HIV risk behaviors could ultimately translate into lower STI/HIV risk behaviors in emerging adulthood; and (2) factors beyond STI/HIV risk behaviors in adolescence have a more important influence on STI/HIV risk behaviors in emerging adulthood, since the relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood was not very strong. This suggests that it is possible for adolescents with risky STI/HIV behaviors to move to a lower risk trajectory during the transition to emerging adulthood.

VI.4. Conclusion and future research

The purpose of this study was threefold: (1) to examine the relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood, and investigate gender and racial differences in this relationship; (2) to examine the association between adolescents' STI/HIV risk behaviors and three friendships dimensions, namely, number of friends, closeness to friends, and friends' STI/HIV risk behaviors; and to determine whether the association varies by gender and race; and (3) to examine the effects of interactions between friendship dimensions in adolescence on emerging adults' STI/HIV risk behaviors, controlling for respondents' baseline STI/HIV risk behaviors; and investigate gender and racial differences in these associations. Several interesting findings emerged from these analyses, most notably: the (weak) positive relationship between STI/HIV risk behaviors in adolescence and those in emerging adulthood; the absence of an interaction effect between friendship (number of friends, emotional and behavioral closeness to friends) and friends' (friends' STI/HIV risk behaviors) characteristics to predict STI/HIV risk behaviors in emerging adulthood; the direct effect of behavioral closeness to friends on STI/HIV risk behaviors in emerging adulthood; and the lack of variation of the majority of the proposed hypotheses by gender and race.

Future research could build on this study in several ways to further our understanding of the influence of adolescent friendships and STI/HIV prevention among youth. As mentioned previously, this study's findings regarding the relationship between STI/HIV risk behaviors in adolescence and

those in emerging adulthood could be replicated in a larger and more representative sample to confirm the observed results of this study. For example, a similar analysis could be conducted using the core Waves I and III of Add Health, rather than just the sub-sample of the saturation schools. In addition, more research is needed on the development of measures for STI/HIV risk behaviors among young people that adequately reflect their STI/HIV risk. Adolescents experience great changes in sexual behavior during the transition to emerging adulthood (e.g., initiation of sexual behaviors, dating). Knowing the exact combination of behaviors they engage in would prove useful to target appropriate prevention messages (e.g., adolescents could be having riskier behaviors within the context of one relationship; or their risky behavior could relate to their involvement in concurrent relationships). More research is also needed to investigate the relationships between friendships and other important social contexts for adolescents, most notably the family environment.

This study integrated developmental theories into public health to investigate the effect of adolescent friendships on emerging adults' STI/HIV risk behaviors. Developmental theories suggest that having friends and forming high-quality friendships in adolescence are positively associated with adolescents' adjustment, while Primary Socialization Theory proposes that friendships may not always be beneficial, depending on the characteristics of the friends, i.e., the characteristics of the friendship and that of the friends interact. In this study, the absence of an interaction effect between any of the friendship dimensions (number of friends, behavioral and emotional closeness to friends) and friends' STI/HIV risk behaviors, coupled with the presence of a direct positive effect of behavioral closeness to friends (an indicator of friendship quality) on STI/HIV risk behaviors in emerging adulthood, raises important questions regarding the validity of integrating developmental theory into prevention programming. Taken as is, findings could suggest that the basic premise of the developmental theories, that high-quality friendships in adolescence are crucial for adolescent development irrespective of the characteristics of the friends, is incompatible with public health prevention, since the latter acknowledges that friends' behavior are important influences on

136

adolescents' behaviors. However, a couple of points are worth noting, that could direct future research in this area.

First, the investigation of the long-term effects of friendship dimensions has most often focused on *psychosocial* indicators of adjustment (e.g., self-esteem, social and communication skills). The findings in this area generally converge and point to a beneficial influence of adolescent friendships. Research is increasingly showing that youth with risky behaviors enjoy as many reciprocated and close friends as non-delinquent control subjects and report equal levels of caring and trust within their relationships (Giordano, 2003; Giordano et al., 1986; Haynie, 2002). This finding was also supported in this study as no differences were found across STI/HIV risk behaviors for behavioral and emotional closeness to friends, and only a very small effect of number of friends (Aim II). It therefore appears that the friendships of adolescents with varying levels of risk behaviors are equally likely to provide opportunities for adolescents to acquire social skills that will benefit them on the long run.

However, the long-term effects of adolescent friendships on *behavioral* outcomes in emerging adulthood, specifically on STI/HIV risk behaviors, may not be as straightforward. Indeed, the extensive research in public health linking (to varying degrees) friends' behaviors to adolescents' behaviors makes it impossible to consider investigating potential effects of friendship quality or quantity without considering first their interaction with friends' STI/HIV risk behaviors. However, the absence of any interaction effect in this study and the positive relationship between adolescent closeness to friends and STI/HIV risk behaviors in emerging adulthood should not necessarily imply that the developmental theories' perspective that friendships are beneficial for development is not applicable to behavioral outcomes and should only be confined to the psychosocial domain. A promising area for future research should consist in the examination of the interaction between the friendship quality and friends' STI/HIV risk behavior of a close friend. As mentioned previously, the nature of the STI/HIV risk behaviors under investigation may be less conducive to the influence of the friendship group and more to that of one close friend.

Finally, the relationship between the quality of adolescent friendships and the quality of romantic relationships (i.e., looking beyond just involvement in a relationship) deserves further attention, as it may illustrate the pathways linking the quality of adolescent friendships and STI/HIV risk behaviors in emerging adulthood. Collins and Van Dulmen (2006) argue that peer relationships influence the quality of romantic and sexual relationships. They state that the views and skills developed through close friendships during childhood and adolescence are carried forward and influence early romantic relationships. Therefore, high quality friendships, assessed *using a multidimensional approach to quality* (beyond just closeness, as discussed previously) are likely to predict high quality romantic relationships which may be linked to less STI/HIV risk behaviors.

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