Relationships between Adolescent Stress, Depressive Symptoms, Social Support, Coping and Sexual Risk Behavior in Young Adulthood

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Abstract

Objective
To describe longitudinal associations among adolescent stressful life events, depressive symptoms, coping skills, social support, and young adult sexual risk behaviors and sexually transmitted infection (STI) in the United States.

Design
A total of 18,924 participants aged from 12 to 18 at baseline were included in the analysis. The study's design was a secondary analysis of three waves of longitudinal data utilized structural equation modeling (SEM) to test direct and indirect effects of adolescent stressful life events, depressive symptoms, problem-focused coping skills, unhealthy coping strategies, and social support on young adult sexual risk behavior. To examine the hypotheses of this study, three main structural models were evaluated. Model 1 explores the effects of depressive symptoms and stressful life events as the potential mediator of the association between mental health problems and sexual risk behavior, while Model 2 tests mediating effect of unhealthy coping strategies. Lastly, Model 3 examines the indirect effects of problem-focused coping skills and social support on sexual risk behavior.

Results
As anticipated, direct effects were found for adolescent stressful life events and unhealthy coping strategies on young adult sexual risk behavior. Adolescent stressful life events and unhealthy coping also significantly mediated the relationship between
depressive symptoms and young adult sexual risk behavior. Higher social support from family and problem-focused coping strategies were associated with lower depressive symptoms and stressful life events in adolescence. Adolescent social support from family and problem-focused coping skills were shown to influence young adult sexual risk behavior indirectly through reducing stressful life events.

**Conclusions**

Given the associations between stressful life events, depressive symptoms, and sexual risk behavior, these findings highlight a need for screening for depression and stressful life events in adolescents. Findings may also be useful to inform interventions for high-risk adolescents facing psychological stressors and suggest that coping skills training and enhancing social support should be specific targets.
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Organization of the Dissertation

This dissertation is organized into several chapters. Chapter I presents an introduction to this research study and provides the study’s specific aims and hypotheses. Chapter II provides a review of literature relevant to this study. This chapter will explain the theoretical framework for the current study, examine the relationships between a wide range of psychosocial factors in adolescence and sexual behavior outcomes, and describe previous research focusing on adolescents’ coping skills or social support resources (such as parents or friends), and whether coping and social support are protective against risky sexual behaviors at the young adulthood stage.

Chapter III contains an introduction of the research methodology, information about the sample of the study, an explanation of measures in the study, and a description of the data analytic strategy. Chapter IV focuses explicitly on the results from both descriptive and inferential statistics. The purpose of this chapter is to describe the empirical findings of the study. It includes a discussion of demographic findings and bivariate relationships, as well as results from statistical testing for each specific aim. Finally, Chapter V will provide a discussion of the results obtained and presented in Chapter IV. Implications of the results and suggestions for future research are also discussed.
CHAPTER I: THE RESEARCH PROBLEM

Background and Significance

Youth continue to bear a major burden of sexually transmitted infections (STIs), including HIV infection, in the United States. Results from recent surveillance data from the Centers for Disease Control (CDC) indicate that 21% of concurrently diagnosed HIV infection cases were among youth aged 13-24 years (Center for Disease Control, 2015). Although youth ages 15-24 make up for only 25% of the sexually active population, they account for approximately 50% of all new STIs that occurred in the USA (Center for Disease Control, 2013). For example, the prevalence rate of chlamydia among young people is consistently higher than in any other population group. In 2013, the number of chlamydia cases among young people (949,270 in the 15 to 24 year age group) represented 68% of the total cases of chlamydial infection (Centers for Disease Control, 2013b). Additionally, of the estimated 820,000 new gonorrheal infections occurring in the United States in 2014, approximately 70% (570,000) were among youth aged 15-24 (Center for Disease Control, 2015). Although there is a relative paucity of research on the prevalence and incidence of trichomoniasis, it is estimated by available evidence that it is the most highly prevalent non-viral STI in the USA. The National Longitudinal Study of Adolescent to Adult Health (Add Health), suggests that trichomonas vaginalis prevalence was 2.3% among youth aged 18-26, which was similar to that of chlamydia (4.2%) and far higher than that of gonorrhea (0.3%) (Miller et al., 2005).

**STIs and Associated High-Risk Behaviors:** STIs may be viewed as a reflection of high-risk behavior, such as unprotected sexual intercourse, sex with multiple partners,
and frequency of sexual intercourse. Despite the high prevalence of STIs among youth only 58% of students surveyed in the 2013 YRBS reported using condoms at last sexual intercourse (Kann et al., 2014). Among those youths (aged 10-24) who were sexually active during the past three months before the YRBS, 15% of female and 35% of male participants reported having had two or more sexual partners during that period (Kann et al., 2014). In addition, sexual activity patterns such as multiple partners have also demonstrated some utility in predicting STI risk among emerging adults (Lindley et al., 2008). Arnett (2004) referred to the term “emerging adulthood” as the transitional period from late adolescence to adulthood and considered it as a distinct and critical developmental stage in which several factors contribute to the development of problematic behaviors.

Emerging adulthood has been considered, by definition, as the period of life from age 18, the age most adolescents finish secondary school, through age 29, when they begin moving toward making lasting commitments (e.g., long-term relationships, parenthood or a long-term occupation) (Arnett, 2014, p.7). According to the theory of emerging adulthood (ages 18-29) proposed by Arnett (2000), this period of life is also known as the “age of instability” (Arnett, 2000, p.21) and is important for several reasons: First, emerging adults have low levels of parental supervision and monitoring (White et al., 2006), at the same time they have limited experience in monitoring their own health behaviors (Patrick et al., 2007). Second, they have unprecedented levels of personal freedom during this period that were not achievable in adolescence, and sometimes this means engagement in risky behaviors (Arnett, 2014, p.112).
Specifically, the following risk factors are commonly associated with increased incidence of STIs among emerging adults (18-25 years old): number of sexual partners, frequency of condom use, and frequency of sexual intercourse (DiClemente et al., 2011; Seth et al., 2014). In fact, despite the numerous studies that have focused on sexual risk behaviors of adolescents, many risky sexual behaviors actually tend to peak during emerging adulthood (Dariotis et al., 2008; Bonar et al., 2014). For example, findings from the National Health and Nutrition Examination Surveys (NHANES) revealed that sexually active emerging adult women (20-24 years) were more likely to report having at least 3 partners during their life (78%) as compared to adolescent women (51%). Additionally, 70% of sexually active emerging adult men (20-24 years), compared to 56% of adolescents (14-19 years) in the NHANES, reported having at least three lifetime partners (Liu et al., 2015).

There is also a marked disparity between sexually active adolescent versus sexually active emerging adults in regard to prevalence of condom use at last sexual intercourse. According to results from the 2013 national YRBS, in contrast to the increase in sexual activity, prevalence of having used a condom during last sexual intercourse declines substantially with increasing age (Kann et al., 2013). The prevalence of condom use at last sexual intercourse was higher among 9th-grade (62.70 percent), 10th-grade (61.7%), and 11th-grade (62.3%) than 12th-grade (53.0%) students. When compared to adolescents, emerging adults are more likely to experience casual sex (i.e., sexual activity out of the context of a formal relationship) (Sandberg-Thoma, & Kamp Dush, 2014), and to report having unprotected sexual intercourse after drinking or using drugs (Bonar et al., 2014).
Understanding STIs risk among young adults aged 25-29 is also essential, as women aged 25-29 had the highest birth rate in 2014 (105.7 birth per 1,000 women). Thus, STIs, particularly those that can be transmitted from an infected mother to her fetus during pregnancy or during delivery, jeopardize not only the well-being of young adult women and their partners, but the health of their offspring as well (Hamilton et al., 2015). In addition, the rate of syphilis was also highest among men between the ages of 20 and 29 years, a rate that increased almost 15 percent (from 24.4 per 100,000 people to 28.0 cases per 100,000 people) during 2012-2013 (Center for Disease Control, 2014).

Because STIs are preventable, effective measures are urgently needed to maximize reduction of new infections. For example, identification of variables predictive of risky sexual behavior among adolescents will aid significantly in the development of early prevention programs designed to intervene before any exposure to STIs has occurred. Further, identifying these factors is critical in an effort to reduce health disparities. Compared to the general population, specific groups of youth appear to be disproportionally at risk for STIs. For example, in 2013, African-American youth aged 13-24 accounted for approximately 60% of new AIDS cases among youth in the United States, followed by Hispanic/Latinos (20%) (Centers for Disease Control, 2015). Thus, to address this health disparity among youth, it is vitally important to identify the modifiable protective/risk factors associated with STIs.

In summary, high rates of STIs are not surprising given what is already known from the existing literature about sexual risk behaviors among emerging adults, but they do suggest that identifying risk and protective factors associated with risky behaviors deserve particular emphasis.
**Reasons for Sexual Risk Behaviors:** Many youth, specifically at-risk adolescent populations, continue to engage in sexual risk-taking for many complex reasons, including individual, family and social factors (Reece et al., 2010). Individual-level contributors to adolescent risk taking behaviors might include mental health status, stressful life events, and poor coping skills. The association between adverse psychological conditions with various deleterious consequences of sexual risk behavior is well supported in the literature (DiClemente et al., 2001; Shrier et al., 2001; Brown et al., 2006). Specifically, depressive symptoms have been linked to risky sexual behaviors including engaging in unprotected sexual intercourse (Brown et al., 2006), having multiple or high-risk sex partners (Williams & Latkin, 2005; Ethier et al., 2006), early sexual debut (before 15 years of age) (Spriggs & Halpern, 2008) and history of STDs (Shrier et al., 2001; DiClemente et al., 2001).

A focus on risk factors such as stressors and psychological distress may help identify appropriate interventions to better reduce risk behavior rates. For example, in effort to reduce adolescents’ engagement in sexual risk behavior, Sales et al. (2010) investigated the effectiveness of an HIV prevention intervention targeting an array of psychosocial factors among African American adolescent females who reported a high level of depressive symptomatology over 12-month assessment period. Results indicated that by altering negative or dysfunctional thinking, adolescents who reported above threshold levels of depressive symptoms were more likely to experience improvement in self-protective HIV behaviors (Sales et al., 2010). Compared to the comparison group, participants in the intervention group increased their condom use, were less likely to have
an STD, demonstrated more condom use skills, and less subsequent depressive symptomatology (Sales et al., 2010).

These findings imply that even if adolescents with depressive symptoms are informed about risks, there may be difficulty persuading them to follow precautionary health messages because of dysfunctional patterns of thinking. Sales et al. (2010) discussed that such negative thoughts can make rational decision making difficult, and ultimately lead to undesired behavior fueled by emotionality rather than rationality. Negative emotions such as sadness that are often associated with dysfunctional cognitions can impair problem solving processes or hinder the ability to use appropriate decision-making strategies. This suggests that although the findings by Sales et al. (2010) provided a preliminary identification of the links between depression, dysfunctional thinking, and high risk behaviors in adolescence, further investigations on the mechanisms that produce associations between these variables are needed within the developmental period of emerging adulthood. This is because mental health problems, including depressive symptoms, seem to persist from adolescence into young adulthood making them more vulnerable to many risk behaviors (e.g., drinking alcohol, drug use, and risky sexual behavior) (Bardone et al., 1998).

One of the remaining challenges in research focused on the linkages between depression and risky behavior is to clarify the underlying mechanisms. Psychological theories may point to potential mechanisms through which adverse psychological conditions including depression and stress influence risky sexual behavior in youths. For example, research on stress generation has proposed that depressed individuals, through their depression and behavioral styles, generate stressful circumstances, which, in turn,
increase subsequent depressive symptomatology (Hammen, 1999). Moreover, the significant role of coping strategies as predictors of psychological adjustment to stressful situations among adolescents has been well-documented (Compas et al., 2012; Dunbar et al., 2013; Holahan, Moos, & Bonin, 1999). However, few studies explore the protective effects of effective coping strategies while considering the influence of both adolescence depressive symptoms and negative life events in the context of risky sexual behavior in emerging adulthood. To fill this gap, the present study expands on previous research on the association of adolescent depressive symptoms with emerging adult sexual behaviors by examining the effects of coping skills and social support on the relationship between stress, depressive symptoms and risky sexual behaviors.

**High-Risk Behaviors in Emerging Adulthood:** Risk behaviors (e.g., including delinquency, illicit drug use, and sexual risk behaviors) that primarily peak during mid and late adolescence have been found to dramatically increase during emerging adulthood (Brook et al., 2011; Steinberg & Morris, 2001; Pharo, Sim, Graham, Gross, & Hayne, 2011). Alcohol becomes legal at 21 years of age, cigarettes at 18, and marijuana use is usually thought to be more available once this population leaves their parents’ homes, especially if they are leaving for college. The rates of substance use among college students have been increased steadily since the 1990’s, including alcohol and other drug use (Johnston, O'Malley, & Bachman, 2000; Johnston et al., 2015). These substances can have lasting health effects, especially if they are abused, or if a person becomes addicted. The Substance Abuse and Mental Health Services Administration (SAMHSA) found that young adults 18 to 25 years of age report the highest prevalence of illicit drug use and abuse when compared to all other age groups in the U.S.
The preceding studies indicate that emerging adults engage in an alarmingly high rate of risky behaviors. The following section reviews the results from several existing studies that investigated the susceptibility of emerging adults to risky behaviors.

**Factors Predicting High-Risk Behaviors in Emerging Adulthood**

The most consistent predictor of risk behavior in emerging adulthood is previous behavior problems during adolescence (Rohrbach et al., 2005; Brook et al., 2011). Adolescents who start using substance at an early age may display an enduring pattern of behavior that persists well into adulthood (Tapert, Aarons, Sedlar, & Brown, 2001). Patterns related to sexual behavior may also persist from adolescence into emerging adulthood (Cooper, 2002). For example, in their study, Bailey et al. (2008) investigated associations between sexual risk behavior, academic performance 6-month post high school, and prior risk behavior (i.e., casual sex, inconsistent condom use, and risky sex) during adolescence. Youths who reported higher levels of risk behavior in high school, such as low academic performance, substance use and sexual risk behavior, were more likely to continue the same problem behaviors in college. Bailey et al. (2008) suggest that STI and HIV prevention efforts are needed among high school students who have poor academic performance, use substances, or engage in sexual risk behaviors.

Other strong predictors of risk behaviors in emerging adulthood are psychosocial factors (e.g., depression, or stressful life events) during adolescence which predispose individuals toward assuming or avoiding certain adult roles (Bachman et al., 1997; Kandel, Davies, Karus, & Yamaguchi, 1986; Newcomb & Bentler, 1988). For example, young adults who had a history of depression in adolescence tend to report significant
levels of social dysfunction (Leader & Klein, 1996; Newcomb & Bentler, 1988), later depression (Reinherz et al., 1999), and nicotine and alcohol dependence (Fergusson & Woodward, 2002).

**Statement of Purpose**

To extend knowledge in this area, the present study examines adolescent psychosocial risk/protective factors (e.g., depressive symptoms, coping strategies) that predict sexual risk behavior during the transition to adulthood and documents a wide range of psychosocial factors that may influence emerging adults’ sexual risk behavior. This study used data from Wave I (1994–95, n = 20,745, aged 12–18 years), Wave II (1996, n=14,738, aged 13–20 years) and Wave III (2001–2002, n =15,197, aged 18–28 years) restricted-use data sets of the National Longitudinal Study of Adolescent to Adult Health (Add Health) (Harris et al., 2009a). Specific hypotheses based on a theoretical framework were tested, using a series of structural equation models, to examine effects of stress, depressive symptoms and coping skills on sexual risk-taking behaviors from adolescence to emerging adulthood.

**Specific Aims**

The study will address the following research aims and hypotheses:

*Specific Aim 1:* Examine the relationships between stressful life events, depressive symptoms and subsequent risky sexual behavior (frequency of sexual intercourse, condom nonuse and having multiple sexual partners) during adolescence and emerging adulthood (see Figure 1). The hypotheses for the first model are:
Hypothesis 1a: Depressive symptoms at Wave II will be predicted by stressful life events at Wave I independent of depressive symptoms at Wave I, while stressful life events at Wave II will be predicted by depressive symptoms at Wave I independent of stressful life events at Wave I (see Figure 1).

Figure 1: Model 1, Hypothesis a

Hypothesis 1b: Stressful events at Wave II will mediate the relationship between depressive symptoms at Wave I and risky sexual behaviors at Wave III (see Figure 2).

Hypothesis 1c: Depressive symptoms at Wave II will mediate the relationship between stressful life events at Wave I and risky sexual behaviors at Wave III (see Figure 2).
Specific Aim 2: Examine relationships between depressive symptoms at Wave I, unhealthy coping strategies and stressful life events at Wave II, and risky sexual behavior at Wave III. The hypotheses for the second model are:

Hypothesis 2a: Higher stressful life events at Wave II will be associated with unhealthy coping strategies at Wave II, which in turn has a positive direct effect on risky sexual behaviors at Wave III (see Figure 3).
Hypothesis 2b: Unhealthy coping strategies at Wave II will mediate the relationship between depressive symptoms at Wave I and sexual risk at Wave III (indirect effect) (see Figure 4).

Figure 4: Model 2, Hypothesis b

Specific Aim 3: Examine the relationships between perceived social support (Wave I), problem-focused coping skills (Wave I), stressful life events (Wave II), depressive symptoms (Wave II), risky sexual behaviors (Wave III), and STIs during adolescence and emerging adulthood (see Figure 5 and 6). The hypotheses for the third model are outlined as follows:

Hypothesis 3a: Higher levels of problem-focused coping at Wave I will be associated with fewer stressful events at Wave II, which in turn leads to less risky sexual behaviors (indirect effect). Stressful life events at Wave II were hypothesized to have direct positive effects on STI at Wave III.

Hypothesis 3b: Higher effective coping at Wave I will be associated with less depressive symptoms at Wave II, which in turn leads to less risky sexual behaviors
Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

*Hypothesis 3c:* Higher levels of perceived social support from family and friends at Wave I will be associated with fewer stressful events at Wave II, less risky sexual behavior (indirect effect). Stressful life events were hypothesized to have direct positive effects on STI at Wave III.

*Hypothesis 3d:* Higher levels of perceived social support from family and friends at Wave I will be associated with fewer depressive symptoms at Wave II, less risky sexual behaviors (indirect effect). Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

**Figure 5: Model 3 (Family’s Support)**
Figure 6: Model 3 (Friends' Support)
CHAPTER II: REVIEW OF LITERATURE

The goal of this chapter is to provide an overview of previous research that most closely relates to the proposed study. The chapter begins with a discussion of the literature that informs the general theoretical framework. After a brief overview of the theoretical model used in the dissertation, the chapter provides a discussion of the following key areas in order to support the study’s aims and hypotheses: stressful life events, depressive symptoms, coping strategies (the role of adaptive coping skills as it relates to the concerns of the proposed research), and social support, especially focusing on the role of social support received from family and friends.

Theoretical Model

**Stress Generation Model of Depression**

The link between depression and unsafe behavior (such as substance use and risky sexual behavior) may be explained by Hammen’s (1991) ‘stress generation’ model of depression, which posits that individuals are vulnerable to depression because they developed pessimistic views of themselves (e.g., worthlessness, carelessness) as a result of stressful events in life. According to Hammen’s theory (1991), although stressful life events may precede depression in vulnerable individuals, the relationship is reciprocal.

Previous literature demonstrates that stressful experiences often precede the occurrence of the adolescent behavioral problems and the onset of depression (Ge et al., 1994; Williamson et al. 1998; Tram & Cole, 2000; Kardum & Krapić, 2001; Adkins et al., 2009). Stress has been proposed as an underlying mechanism for chronic depression (Hammen, 1991). This association holds true for all three major forms of stressors: acute stress or reaction to an immediate threat perceived as danger (Rojo-Moreno et al., 2002),
chronic or frequent exposure to challenges (Checkley, 1996) and stressful life events or major objective experiences that disrupt an individual’s usual activities (Hammen, 1995).

First, acute stress is linked with stressful life events resulting from significant life changes and typically has a relatively clear start and ending (e.g., getting into a car accident). Chronic stress, on the other hand, is generally more linked with disease (e.g., heart disease, Type II diabetes, and depression) because the body experiences prolonged exposure to the physiological effects of the stress response and tends to persist over time. This stress does not necessarily start with an event, but gradually creates permanent problematic conditions in social environment. Some forms of chronic stress include job stress, family stress, insecurity, and conflicts. Finally, stressful life events (e.g., violence, suicide, and death) are unpleasant major events in a person’s life that typically have shorter time course than chronic stressors. They can clearly impact performance, occur suddenly, and require sudden response (Driskell & Salas, 2013, p.7).

The present analysis focuses on adolescent stressful life events and their relations with psychosocial factors and sexual risk behavior in emerging adulthood. This focus is not intended to minimize the importance of the influence of chronic stress in adolescence. Although chronic stress can be considered as one of the major types of stressful situations, most theories of psychological stress have put greater emphasis on studying reactions to acute life situation (Garbarino & Kostelmy, 1994). Chronic stress situations result when the threat situation is persistent without interruptions and recovery is not possible (Driskell & Salas, 2013, p.7). Elliot & Eisdrofer stated that chronic stress may involve situations that can be long-lived and consequently perceived as more similar to a normal situation (such as financial problems or workplace pressures). Instead, the
primary interest of this study is on threat situations in which the perceived danger exceeds the perception of resources to cope. Lazarus & Folkman (1984) noted that a person may appraise a stressful situation as threatening, challenging, or harmful. Under stressful life situations, threat appraisal focuses on the harm or the potential harm of an event, is associated with primarily negative emotional reactions, and may trigger depressive symptoms. However, it is equally true that depression may result in behaviors and impairments in functioning that tend to create stressful events which, in turn, may lead to continued depression (Hammen, Brennan & Keenan-Miller, 2008; Lewinsohn et al., 2001; Williamson et al., 1998; Hammen, Brennan, & Le Brocque, 2011).

There is evidence available in the literature that supports the stress generation model or the reciprocal association between depression and stressful life events in adolescence. For example, Rudolph et al., (2000) presented evidence that depressed children aged 8-18 years generate stressful circumstances particularly in the interpersonal domain (such as interpersonal stress), which, in turn, result in more depression. In a longitudinal study of a sample of 916 adolescents aged 9 to 16, Johnson et al., (2012) also found that baseline levels of stressful life events were both a risk and consequence of depression, suggesting a reciprocal interaction between the individual and the environment. In addition, in two longitudinal studies of stressors and depressive symptoms in adolescents (N =708), Cole et al., (2006) found that, not only do stressful life events predict an increase in later depressive symptoms, but also that baseline depressive symptoms lead to increases in subsequent stressors, even after controlling for prior levels of stressful life events.
While exposure to stressful life events and their impact on mood may contribute to explain why some adolescents have more symptoms of depression, the way that individuals respond to stress is also a risk factor for development and recurrence of depression (Lazarus & Folkman, 1984). A likely mechanism contributing to stress generation is maladaptive characteristics (e.g., problem-solving coping styles, impaired social skills), which, in turn, may contribute to vulnerability to depression. The next section looks at the Transactional Model of Stress and Coping proposed by Lazarus in 1960’s, which provides a suitable theoretical framework for understanding the psychological consequences of coping with stressful situations.

**Transactional Model of Stress and Coping**

Research suggests that individuals who can cope effectively are able to prevent depression, even when exposed to many stressful events in their lives (Lazarus & Folkman, 1984). One of the most frequently cited definitions of coping was proposed by Lazarus and his colleagues who defined coping as: “the cognitive and behavioral efforts to manage specific external or internal demands (and conflict between them) that are appraised as taxing or exceeding the resources of a person” (Lazarus, 1991, p. 112). Coping may include efforts, behaviors, and cognitive responses designed to overcome, reduce, or tolerate these demands and the conflicts between perceived demands and available resources (Lazarus & Folkman, 1984). According to Lazarus and Folkman’s model, the outcome of adaptation efforts to stress depends on appraisal processes (i.e., personal meaning of a stressor and one's resources and ability to cope): primary and secondary appraisal of a stressful situation (see Figure 7).
Lazarus and Folkman (1984) depict coping as a two-step process. When facing a stressor, in order to handle the stressor, a person appraises the situation to classify whether the situation is a potential threat, non-threat, harm or challenge according to available coping resources (this is called primary appraisal). Lazarus defined threat as some anticipated demand; harm as demand that has already occurred, such as injury; and challenge as an individual’s confidence in effectively dealing with difficult demands. According to Lazarus (1966), stress can arise when a person confronts a situation that was perceived as a threatening or demanding situation and does not have appropriate coping strategies (see Figure 7).

The secondary appraisal refers to an individual’s evaluation of coping resources available for dealing with those demands (Lazarus, 1991). Secondary appraisals focus on what an individual can do about a potential stressful situation. Coping is the process through which an individual manages the demands of the environment that are appraised as stressful and the emotions that are typically associated with threat (Lazarus et al., 1984).

For example, the decision regarding whether to use condoms in a sexual relationship appears to be a type of psychosocial stress. It involves evaluating the significance and the primary appraisal of anticipated outcomes (e.g., threat or rejection). For instance, many youths may perceive condom requests as a potential threat to relationship maintenance. In secondary appraisal, individuals must decide what they can do about the stressful situation. During this secondary appraisal, they evaluate whether or not they have sufficient coping resources to deal with the perceived threat. This secondary appraisal determines the levels of assertiveness for condom negotiation and
ultimately results in decisions about whether to have sexual intercourse without a condom. An individual’s coping strategies may be facilitative and result in making the decision to use condoms, or may be less facilitative and result in nonuse of condom. It is reported in literature that most of youth who use condoms consistently employ problem-focused coping strategies rather than emotion-focused and dysfunctional coping strategies (Ballester-Arnal, Ruiz-Paomino, & Gil-Llario, 2016).

According to Lazarus and Folkman (1984), prior experiences and available resources heavily influence cognitive appraisal of current events. In other words, coping resources may serve as a buffer between stress and health outcomes, including mental (Cheng, Lau & Chan, 2014; Lohman & Jarvis, 2000) and physical health (Vaughn & Roesch, 2003). Actual coping efforts aimed at changing a stressful situation may lead to outcomes of the coping process. When an individual is challenged by stressors, positive outcomes (such as psychological well-being) result when she or he has a variety of buffering resources (e.g., good problem-solving abilities, available support systems such as family and friends) that support healthy, effective coping to successfully manage current stressful situations. By contrast, negative outcomes, such as depression, occur when stressors outweigh available coping resources.

Lazarus and Folkman (1985) found that coping strategies can be conceptualized into two major categories, each comprising specific actions: problem-focused strategies—behaviors taken to alter the stress-inducing circumstances for the better (e.g., gathering information, making an action plan and following it) — and emotion-focused strategies—efforts primarily designed to alter one’s internal emotional reaction associated with stress-inducing circumstances (e.g., seeking social support, talking to
someone to find out about the situation). Both strategies can be used to cope with stressors, and a combination of these strategies can be used to cope with the same stressor. According to Lazarus & Folkman (1987) people tend to use both problem- and emotion-focused strategies to deal with internal/external stressors posed by virtually every kind of real-life stressful situations.

The current study uses Lazarus and Folkman’s (1984) Transactional Theory of Stress and Coping in examining whether the adolescents’ coping strategies (i.e., problem-focused and emotion-focused such as family and friends social support) were effective in reducing young adult sexual risk behavior. This study does not take into account the appraisal process of the stressful events mentioned in the model.

**Figure 7: Transactional Model of Stress and Coping (Lazarus & Folkman, 1984)**
Key Concepts Used in the Study

In this section, the key concepts used in this dissertation will be defined within adolescents’ and young adults’ risky behavior context.

Stressful Life Events

Stressful Life Events and Mental Health

Stressful life events are defined as circumstances that alter an individual’s usual activities, resulting in substantial readjustment-requiring changes that are often quite stressful (Dohrenwend, 2006). Life events cause acute changes which necessitate individuals to make significant behavioral readjustments over a short period of time (e.g., death of loved one, pregnancy) (Thoits, 1995). Several studies emphasize the effects of stressful life events on adolescent mental health. Rutter et al. (1977) found that stressful life events have a cumulative impact on the risk of a poor outcome. In the literature, increased stressful life events have been linked with adolescent mental health problems, including depression and psychiatric disorder (Turner & Lloyd, 1995). Longitudinal studies have shown that, even after adjusting for previous depressive symptoms, cumulative stressful life events may lead to an episode of major depression in adolescents (Abela & Skitch, 2006; Booij et al., 2013).

Considerable research has shown that stressful life events are the provoking agents for depression in both adults (Hammen, 1991, 1992, 2005; Stroud, Davial, & Moyer, 2008) and adolescents (Abela & Skitch, 2006). Although major life events such as death of a friend or family members may be associated with adolescent depression (Williamson, Birmaher, Dahl, & Ryan, 2005), exposure to less traumatic events (e.g., school failure) are also linked to increased depressive symptoms (McCarty et al., 2008.).
However, the magnitude of the link among depression initiation and stressful life events may be quite modest (Hammen et al., 1989); therefore, researchers have proposed more complex models involving one or a number of individual characteristics on how stressful life events impacts the development of poor mental outcomes such as depression.

The relationships between life stressors and maladaptive outcomes have been shown to be influenced by individual characteristics that trigger vulnerability to the negative effects of stressful life events (Lazarus, 1991). Such characteristics as coping resources and a person’s social environment may interfere with the relationships between stressful life events and the development of poor outcomes. With respect to these personal characteristics, Lazarus (1991) mentions that several factors such as the appraisal of stressful events and personal coping resources predict perceived positive effects or negative effects in individuals exposed to a significant stressful event, and negative effects predict development of subsequent depression. In other words, whether a particular stressful event triggers maladaptive outcomes, such as depression, may depend on personal interpretation of a situation and coping resources and options (see Figure 7) (Lazarus, 1991).

Support for this theoretical contention has been reported for adolescents who reported exposure to stressful life events. For example, a study by Murberg & Bru (2005) found that among adolescents (13–16 years old) exposed to school-related stress, seeking parental support (as a form of adaptive coping) negatively predicted later depression, whereas maladaptive coping styles, such as angry reactions, have been found to increase the risk of developing or triggering depressive symptoms in the future.
Overall, the negative effects of specific stressful life events on adolescence mental health problems such as depression have been documented in the literature; however, not everyone who faces a particular stressful life event will develop depression. The interaction between negative life events and coping processes may play an important role in determining vulnerability to poor mental outcomes among adolescents (see Figure 7).

Stressful Life Events and Risky Behaviors

Findings from previous studies suggest that adolescent’s exposure to several types of stressful life events, including parental divorce (Newcomer & Udry, 1987) and violence (Silverman, Raj, & Hathaway, 2001), are associated with greater likelihood of engaging in risk behaviors during adolescence (Brady, Dolcini, Harper & Pollack, 2009) and young adulthood (Turner, Latkin, & Tandon, 2011). In addition, previous research finds that cumulative stressful life events are associated with sexual risk behavior (Walter, Vaughan, & Cohall, 1991). Stressful life events during adolescence have been shown to be associated with increased AIDS-risk behavior in young adulthood (Stiffman, Dore, Cunningham, & Earls, 1995). Stiffman, Dore, Cunningham, & Earls (1995) reported that adolescents exposed to certain negative life events (e.g., illness, poverty, household violence, family death, homelessness, parental separation/divorce, and unemployment) were more likely to engage in higher HIV-related sexual risk behaviors, including having six or more sexual partners in a year, irregular use of condoms, and having a high-risk sexual partner.

Although the relationships have been noted in the literature, the mechanism by which stressful life events influence sexual risk behavior is not well-understood. Few studies have attempted to identify mechanisms by which adolescents’ stressful life events
may lead to increase sexual risk taking among young adults. However, stressful life events have been reported to be associated with other well-established risk factors for sexual risk behavior, including substance use (Perrieira & Sloan, 2001) and lack of psychosocial resources (Brady, Dolcini, Harper & Pollack, 2009).

For example, a strong body of literature has identified stressful life events as a risk factor for substance use among adolescents, college students, and mature adults (He et al., 2004; Casement et al., 2013; Nation & Heflinger, 2006; Perrieira & Sloan, 2001; Taylor, 2006). Windle & Windle (2005) examined the long-term effects of exposure to stressful life events in a longitudinal study with 120 adolescents. The participants were interviewed once every 6 months over a period of 2 years. After adjusting for alcohol problems in adolescence, the association between adolescent stressful life events and young adult alcohol problems was significant for both males and females. Substance use may interfere with the processing of information and reduce perceptions of personal risk, which can, in turn, influence sexual decision making and increase the likelihood of engaging in risky sexual practices (Fromme, D'Amico, & Katz, 1999).

Psychosocial resources such as social support can serve as protective factors against the negative consequences of stressful life events. For example, Mazzafero et al., (2006) found that among adolescents and young adults (aged 14-25), high levels of stress, greater depressive symptoms, and low social support were all associated with high-risk sexual behavior and STI. Cohen & Willis (1985) proposed that social support can have direct effects on well-being regardless of the level of stress experienced or can act as a buffering agent against stressful experiences.
In summary, researchers have also suggested that factors, such as coping mechanisms and social support, may influence the relationship between stressful life events and sexual risk behavior. Although studies have established that the experience of stressful life events is associated with an increased risk of behavioral problems, particularly substance use and sexual risk behavior, little is known about the effects of such risk as adolescents mature into young adulthood, especially about how coping mechanisms and social support effects depression and sexual risk behavior during this period.

**Depressive Symptoms**

*Depressive Symptoms and Mental Health*

An expanding body of psychosocial research has recognized that depression and stressful life circumstance are associated in youths (Monroe et al., 1999; Lorenz et al., 1994; Michl et al., 2013). A starting hypothesis for this line of research was unidirectional relationships between stressful life events and the onset of psychiatric illnesses, particularly depression. Hammen’s (1991, 2006) stress generation theory of depression expands on this hypothesis by positing that depression also prospectively contributes to the development of stressful circumstances, which, in turn, triggers more depressive reactions (see Figure 8).

Given the focus of the stress generation model on the bidirectional nature of the relationships between stressors and depression, it is particularly important to understand depression during adolescence because stressful events may initiate a self-perpetuating cycle early in life, by which depressive symptoms and associated consequences, such as hopelessness and impaired social relationships, lead to the generation of more stressful
life events that deviate adolescents from normative developmental trajectories. These stressful life events result in an increased risk for long-term adverse consequences of depression.

Figure 8: Perpetuating Cycle of Depressive Symptoms and Stressors Adopted from “Stress Generation Model” by Hammen (1991)

Deepressive Symptoms and Risky Behaviors

Not only is depression itself a major health problem for adolescents, it also places them at risk for engaging in a wide range of risk behaviors and poor outcomes in the future. Trends indicate that adolescent risk behaviors may become increasingly problematic over the life course. For example, Stiffman et al. (1992) looked at the longitudinal association between mental health symptoms, including depression, anxiety, substance use, suicide, and posttraumatic stress in 602 adolescents and their subsequent
AIDS-related risk behavior in young adulthood. This research team found that adolescent mental health symptoms were significantly predictive of young adult sexual risk behaviors, including intravenous drug use or dependence, having multiple partners, and choice of a high risk sexual partner (Stiffman et al., 1992).

In recent studies, more attention is directed to the association between depressed mood (including depressive symptoms) and various deleterious consequences of sexual risk including condom nonuse and STIs (DiClemente et al., 2001; Shrier et al., 2002). For example, in a longitudinal study of sexual risk behavior among sexually active Black female adolescents, DiClemente et al. (2001) found that psychological distress (measured by CES-D) at baseline elevated their fears of the negative consequences of negotiating condom use, increased their perception of barriers to condom use, and lowered their sense of self-efficacy to negotiate condom use with a new partner 6 months later. In an older longitudinal survey of youth, Kowaleski-Jones, & Mott (1998) found significant links between depression and having intercourse at an early age, not using contraceptive and teenage pregnancy.

In addition to the association between depressive symptoms and sexual risk behaviors among youth in general, there is some evidence that some groups (e.g., females, maltreated adolescents) are more likely to be vulnerable than others. For example, Brooks et al. (2002) explored relationships that depression and stress have with risk behaviors in a sample of 2,224 high school female students, and demonstrated that emotional stress and depression were significantly associated with birth control nonuse, even when controlling for age, gender, race, family income, parental education, and episodes of previous psychiatric symptoms. Seth et al. (2011) also explored the
relationships of depressive symptoms and risk behaviors in a sample of 715 African American adolescent females recruited from three primary prevention clinics and found that higher level of depressive symptoms were significantly predictive of condom nonuse over 6-months of follow-up even after controlling for confounders.

These examples illustrate that although evidence supports the association between depression and sexual behaviors, the precise mechanisms are, at present, unclear. Nevertheless, a few important mechanisms appear to be relevant. First, depressed individuals are more likely to engage in risky behaviors with little regard to the potential consequences because of a sense of pessimistic outlook on the future and feelings of helplessness and hopelessness (negative cognition regarding the future), which are the results of the negative appraisals that depressed people make about life stressors (see Figure 7) (Abramson, Metalsky, & Alloy, 1989; Martin et al., 2005). For example, one study of African-American youth (aged 15-24) showed that increased hopelessness was associated with increased risky sexual behaviors (Kagan et al., 2012). In a study of 2,468 inner-city youth, Bolland (2003) showed that a sense of hopelessness and pessimistic view of future were associated to increased participation in violent behavior, substance use, and sexual risk behaviors. Based on this mechanism, depression that involves cognitive factors is strongly linked to risky behaviors.

Second, another possible explanation is that depressed individuals engage in risky behaviors as an attempt to cope with depressive symptoms; this may be particularly true for individuals with poor adaptive coping skills (Cooper et al., 1998; Schuster, Mermelstein, & Wakschlag, 2013). For example, research findings revealed that
adolescents use drugs/alcohol (Swadi, 1999) or may engage in sexual risky behaviors to relieve anxiety or depression (Schuster, Mermelstein, & Wakschlag, 2013).

In summary, although numerous studies have been conducted on relationships between adolescents’ sexual risk behaviors and depression, the underlying mechanism is still unclear. Further research is required to explore the association between stress, depressive symptoms, and other psychosocial factors to provide a better understanding of the mechanism by which depression can lead to risk behavior which subsequently increases the likelihood of certain health problems including STIs among youths.

Coping Strategies

This section starts with the definitions of coping strategies that were used in this chapter. Coping is viewed as an important intervening process between cognitive appraisals of situational demands and outcomes of the stress process. Coping is an important element in understanding adolescents’ response to extensive stressors and the way they adjusted to their experience (Gracia, 2010). Coping responses can be classified into two major categories: 1) Adaptive coping responses are defined as an approach used by the person to manage or alter the nature of the stressors and regulate the emotional response to the problem (Lazarus & Folkman, 1984, p.142). Adaptive coping responses (e.g., seeking information, emotional support, and planning) are mostly helpful in reducing stress and generally promote long-term health; 2) Maladaptive coping responses (e.g., substance use, denial, and self-blame) might reduce the experience of stress in the short-term, but cause more stress or health problems in the long term (Brehm, 2014, p.185). Problem-focused coping is viewed by many scholars as adaptive (Folkman & Lazarus, 1988; McCrae & Costa, 1986) and has been shown to correlate with many
positive outcomes, such as psychological adjustment (Felton & Revenson, 1984), life satisfaction (Utsey et al., 2000), and quality of life (Theadom, Cropley, & Humphrey, 2007).

Folkman (1984) defined problem-focused coping (e.g., problem-solving, information seeking, and decision making), as efforts to change or eliminate the situations that generate stress. An extensive body of research has found adaptive coping responses to have a direct effect on youth physical and mental health and provide protection against the negative consequences of life stressors (Compas et al., 1988; Compas et al., 2012). The following section looks first at the relationship between coping strategies and mental health, then moves on to review studies that have explored the association between coping strategies and risky behaviors, sex as a coping strategy, and substance use as maladaptive coping.

*Coping Strategies and Mental Health*

Studies on the association between coping and depressive symptoms suggest that depressed individuals differ widely in the coping strategies that they employ in times of stress (Coyne, Aldwin, & Lazarus, 1981). Depressed youths have been found to generate more irrelevant strategies for coping with problems than non-depressed ones, and they are more likely to suggest maladaptive responses as strategies for alleviating negative effects (Carvalho & Hopko, 2011; Herman-Stahl, & Petersen, 1996; Ingram et al., 2007). In particular, people who use emotion-focused coping strategies had higher level of depressive symptomatology, whereas the use of problem-focused coping strategies characterizes those with a lower level of depressive symptoms (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984). Focusing on youth in particular, Spence, Sheffield, &
Donovan (2003) developed a school-based problem-solving training program to evaluate the effectiveness of problem-focused coping strategies to prevent development of depression in later life. Eight 45- to 50-minute sessions that focus on cognitive restructuring and problem-solving skills training were provided to young adolescents aged 12-14 years old. Short-term results revealed that adolescents in the intervention group showed significantly fewer depressive symptoms and higher problem-solving skills immediately following program completion compared to control group. However, there were no significant differences in changes on measures of depression, cognitive styles, and problem solving between the two groups at 12-month follow-up, which suggest the importance of considering more intensive and individualized training in problem solving (e.g., longer duration, follow-up prompts, and face to face training).

Studies have also suggested that coping resources may influence the negative health impacts of stress and predict overall psychological adjustment to stressful life events (Peterson, Kennedy, & Sullivan, 1991; Windle & Windle, 1996; Papadakis et al., 2006; Nolen-Hoeksema et al., 1999; Nolen-Hoeksemas, 2001). The type of coping adolescents use may be more important to resolving stressful situations than severity or frequency of the stressors. It is recognized that some coping responses to life stressors may reduce the resulting distress; others may actually exacerbate the problem (Herman-Stabl, Stemmler, & Peterson, 1995), or may not contribute to the benefit of individuals at all (Andrews et al., 1978; Jacobs et al., 2014). Problem-focused coping strategies (i.e., attempts to tackle the problem) were found to be more effective in alleviating stress and achieving positive outcomes than using emotion-focused coping methods (i.e., attempts to reduce emotional distress) (Elgar, Arlett, & Groves, 2003). For example, young people
with a tendency to use problem-focused coping strategies to deal with stressful events were shown to experience less stressful emotional/behavioral problems, while those who tended to use emotion-focused strategies were more likely to report emotional/behavioral issues (Compas, Malcarne, & Fondacaro, 1988). The consistent use of problem-focused coping strategies are often associated with lower level of stress, fewer poor outcomes, and greater overall life satisfaction as opposed to those who use emotion-focused coping strategies as their primary coping resource (Ebata & Moos, 1991).

To summarize, the evidence indicates that certain coping strategies have been associated with better psychological adjustment to life stressors and fewer feelings of depression and stress. Evidence also indicates that adolescents who have psychiatric problems and fewer effective coping skills may engage in risky behaviors. The following section reviews some of the important findings in terms of the relationship between coping strategies and unhealthy behaviors, such as unsafe sexual activities and substance use (Hulland et al., 2015).

*Coping Strategies and Risky Behaviors*

The roles of depressive symptoms and different coping styles in the stress generation process have evolved independently, but are all related. Maladaptive coping styles can lead to unhealthy behaviors including taking illicit substances, alcohol, and engaging in risk-taking behaviors, which, in turn, cause new stressors (Harkness et al., 1997; Hammen, Paley, & Daley, 1995) and can worsen depressive symptoms (Carvalho & Hopko, 2011; Holahan et al., 2005). Depression-prone individuals are more likely to engage in maladaptive coping strategies (e.g., substance use) that put youth at risk by increasing their willingness to engage in self-destructive and risky behaviors such as
unsafe sexual activities, and subsequently contribute to occurrence of stressful events (Williamson et al., 2003; Washbaum et al., 2007).

**Sex as a Coping Strategy:** Although the main purposes of sexual activity are reproduction and enhancing emotional closeness, engaging in sexual behaviors may also serve as a coping mechanism to reduce tension and emotional discomfort similar to the use of alcohol or drugs (Brady et al., 2010; Lyle, 2003; Cortoni & Marshall, 2001). Sexual activity as a coping mechanism was first proposed by McKusick, Horstman, & Coates (1985) who found that the sexual risk behavior of having multiple partners was related to self-report of sexual activity as a way to release tension or cope with stress in the past month.

Cortono & Marshal (2001) also suggest that sex may serve as a coping mechanism, especially during times of increased stress, among individuals who lack adequate social support including a sense of belonging and closeness to someone. Many authors, such as Lee, O’Riordan and Lazebnik (2009) and Lyle (2003), have followed this line of research. Specifically, Lee, O’Riordan, and Lazebnik (2009) proposed that depressed adolescents aged 13-19 years old may use sexual activity to cope with their mood symptoms, either as symptom relief or as self-destructive behavior. And Lyle (2003) examined rates of sexualized coping in a sample of college-age men and found that the majority of participants reported higher use of sexual activities as their primary coping strategy to deal with stressful and problematic situations. Taken together, both of these studies suggest that although sexual activities may temporarily relieve stress, they may have other harmful effects, including STI.
Coping mechanisms related to sexual response may be considered adaptive or maladaptive, depending on whether they harm anyone. A key theoretical assumption that Lazarus and Fulkman (1984) have suggested is that every form of coping can be highly adaptive under certain circumstances but also can be maladaptive under others. Despite the fact that sexual behavior may help some individuals reduce tension and feel better for the moment, unsafe sexual behaviors ultimately remain a maladaptive form of coping because it places the individual and his or her partners at risk for STI transmission (DiClemente et al., 2001; Shrier et al., 2001; Sales et al., 2010).

Substance Use as Maladaptive Coping: Although depressed adolescents may use sexual activities to directly ease depressive symptoms, it has also been suggested that substance use may act as a mediator of the relationship between adolescent depressive symptoms and sexual risk behaviors (Schrier et al., 2001; Turner et al., 2011; Elkington et al., 2010). Youths who use substances are more likely to engage in risky, unhealthy behaviors, such as having unprotected sexual intercourse, inconsistent condom use, and multiple partners (Tucker et al., 2012; Tucker et al., 2010) that can result in unintended health outcomes including STIs (DiClement et al., 2011; DiClemente et al., 2001).

For example, in a longitudinal study focused on the relationships between adolescent substance use and young adult sexual risk-taking behavior, Tapert et al., (2001) found that youth treated for substance use disorders were far more likely than their non-affected counterparts to be involved in risky sexual behavior during both adolescence and the period of transition into young adulthood. A second longitudinal study, which followed adolescents into young adulthood, demonstrated that binge-drinking and marijuana use were significantly related to having multiple sexual partners
and inconsistent condom use after controlling for other substance use and early measures of sexual behavior (Guo et al., 2002). It may be that alcohol or drugs are used as a coping mechanism, which subsequently increases an individual’s likelihood of engaging in other risky behaviors. While substance use may sometimes be considered as a coping mechanism (Wills, 1986), research also suggests that adolescents may use substance following a stressor exposure when they are lacking in other types of adaptive coping strategies, such as problem-focused solving and social support (Hasking & Oei, 2004; Eitle & Eitle, 2014).

To date, only a few studies have attempted to identify mechanism by which different coping strategies may be influencing sexual risk taking among emerging adults. Adaptive coping mechanisms are likely to be key buffers of the relationships between mental health and sexual risk behaviors. For example, Buttram, Kurtz, & Surratt (2003) found that coping mechanisms buffer the effect of stress on depression, which, in turn reduce the impact of depression on risk behaviors. However, further research is needed to examine role of coping, social support, and other psychosocial factors in explaining the relationship between mental health and sexual risk behavior. It is worth mentioning that the theories under investigation in this study do not concern moderation effects but focus instead on the direct and indirect effects of social support and coping strategies.

**Social Support**

For the purpose of this dissertation, social support is defined as the perceived availability of or existence of people who “let us know that they care about, value, and love us” (Sarason et al., 1983, p.128). In the model for the current study, youth may be at risk for risky sexual behaviors when they are both overexposed to adverse life events and
when they lack social support for the timely acquisition of coping skills (Kardum & Krapic, 2001). The following section provides an overview of related research in the social support literature. The relationship between social support and mental health will be described. Next, a summary of the literature that has documented the association between sexual risk behaviors and social support will be provided.

Social Support and Mental Health

As Hammen et al. (1995) has documented, stressful life events may trigger depressive reactions in individuals who have impaired social relationships and coping skills (see Figure 9). A substantial body of research suggests that the experience of fulfilling relationships in life, or perception of such support, plays an important role in vulnerability to depression (Cheng, 1997; Demaray et al., 2005). For instance, Herman-Stahl & Petersen (1999) examined the effects of negative life events, coping, and poor family relations on depressive symptoms during adolescence. The sample was surveyed two times at yearly intervals. The sample (N = 471 participants) consisted of students in sixth grade classes and again in seventh grade. Results indicated that negative life events, coping, and family relationships predicted emergence of symptoms of depression during a 12-month follow up, even after controlling for baseline depressive symptoms. This study supports the idea that adolescents with warm family relations are less likely to become depressed later.
Other indicators of social support (such as quantity of support, perceived social supports from friends, and social support network) have been shown to help to decrease the impact of stressful life circumstances (Stachour, 1998), prevent the onset of depression, and speed recovery from depression when it occurs (Gutiérrez-Zotes et al., 2015; Gotlib & Hammen, 1992; Wang, Cai, & Peng, 2014). Findings have led investigators to hypothesize that depressed mood per se may not directly be the cause for the occurrence of stressors, and the tendency to generate more stressful events may be due to other factors such as the social context in which people live and interact with others.

In addition to the adaptive coping resources discussed in the previous section, perceived social support can affect the relationship between stress and adjustment and act against the adverse effects of stressful life events while perceived lack of social support, particularly in vulnerable individuals, can constitute stressors (Cohen & Willis, 1985, p.310). For example, Demaray & Malecki (2002) found that higher levels of depression
and stress were associated with lower levels of parent and classmate support among adolescents. They also identified positive relationships between perceived social support and social skills, adaptive skills, and self-esteem. This evidence supports that support from family and friends may lower levels of psychological problems and enhance psychological adjustment. Social support may affect the stressful effects of negative events by making appraisals of potential stressors more benign, enhancing feeling of self-efficacy, decreasing in the intensity of physiological reactions to stressors, reducing maladaptive coping responses such as substance use and drinking, and fostering more adaptive coping efforts (Taylor, 2011) (see Figures 8 and 9).

Adolescents’ perceptions of the social support they have available may have an important impact on their ability to cope with stress. In most coping theories, social support is conceptualized as a resource for coping behaviors (Cohen & Wills, 1985; Lazarus & Folkman, p. 158), and is defined as what an individual draws on in order to deal with a given situation (Lazarus & Folkman, p. 158). Researchers have argued that effective coping responses play an important role in buffering the impact of stress on health. In other words, the effect of stress on health depends on the adequacy of coping behaviors which in turn are impacted by social support (Harris, 1989; Holahan et al., 2005) (see Figure 2).

It is germane to mention here that differences exist between perceived social supports and enacted or received supports. Indeed, previous research finds relatively weak or modest relationships between perceived availability of support and actual social support received (McDowell & Serovich, 2007). This reflects the fact that the constructs of perceived support and actual support are largely independent. Some investigators have
also argued that individuals’ *general perception of the availability of social support* are better predictors of the ability to cope with stressors than individuals’ *ratings of the actual supportive behaviors* that have been provided for them in specific experiences they have had. Therefore, from the point of view of coping with stressful life events, perceived social support may be more beneficial in regulating stress response (Mankowski & Wyer, 1997, p. 141).

*Types of Social Support*

Social support may be provided by a variety of sources, such as relatives and friends. There is cumulative evidence that family members and friends are major sources of support for adolescents in their struggle to adjust to stress by providing advice strategies, emotional support, or reinforcing individual’s coping efforts needed to address problems (Procidano & Heller, 1983; Crean, 2004; Stice, Ragan, & Randall, 2004). It has been proposed that parents and friends have independent influences on adjustment with stressful situations among adolescents (Roberts et al., 2000). These different types of social support may bring about different consequences.

It is widely acknowledged in the literature that social support from parents contributes to overall adjustment of adolescents in times of stress (Wenz-Gross et al., 1997). Family support has been shown to protect adolescents against negative effects of exposure to stressful life events in early adolescence (Thoits, 1995; Peterson et al., 1991) and late adolescence (Rubin et al., 1992).

Family support can also be an important source of influence on adolescent mental and social health outcomes, particularly self-esteem and depression (Helsen, Vollebergh,
& Meeus, 2000; Umaña-Taylor et al., 2013), not only in the short term, but also across the lifespan (Repetti, Taylor, & Saxbe, 2007). For example, Newcomb, Michael, & Peter (2007), in their longitudinal 8-year study, examined the relationships between social support and a variety of life problems. They found that prior levels of family and peer support predict substance use, emotional distress, and family problems in young adulthood. The research team concluded that the significant impact of adolescent social support on the psychosocial developmental trajectories of young adults implies that improving quality of interpersonal relationships (or sources of social support) during adolescence should be an important part of intervention and prevention programs.

Although there is accumulating evidence that family support is an important source of influence in promoting adolescent psychological well-being and in buffering the emotional effects of stress, support from friends can also serve as a primary source of emotional support and as a buffering agent in terms of positive adjustment (Valkenburg, Peter, & Schouten, 2006). Specifically, friends become increasingly important sources of support as well as adjustment during early adolescence (Stern, 2015, p.59). Several studies have documented that many youth, particularly in early adolescence, would prefer to seek information and advice from friends rather than parents when seeking support in times of stress (e.g., Bednar & Terri, 2033; Krosnick & Judd, 1982). For example, in a longitudinal study, Vineland et al., (1991) examined the long-term impact of a school-based suicide prevention program on a group of 174 students followed over 18 months. They found that adolescents who participated in the program were significantly less likely to seek help from adult or professionals when they felt depressed or they had
suicidal thoughts; the majority of participants indicated that they would prefer to help their friends on their own or together with other friends.

Because support from parents and friends could be associated with different outcomes, in the current study, separate measures of support from parents and friends were included in the models. For example, measures of support from parents are protectively related to substance use; that is, adolescents with high parent support were less likely to use tobacco (Grube & Morgan, 1990) or alcohol (Grube & Morgan, 1990; Peterson et al., 2010). However, friend support was sometimes positively related to substance use (Wills et al., 2004) or delinquency (Garnier & Stein, 2002). One reason might be that social support from friends comes along with involvement with norms of friends’ network, which may lead to problematic outcomes such as substance use (Miller, 2004, p.423). In addition, poor outcomes may occur if adolescents seek support from friends at the exclusion of parents or other adults. For example, Wills (1990) showed that youth with low support from adult community and high social support from friends were at risk for developing deviant behaviors, including substance use. In the next section of the paper, the evidence on the association between social support and risk behaviors will be presented.

Social Support and Risky Behaviors

One's behavior may be the result of interactions with other people or other influences from their social environment (Maulik & Eaton, 2011; Wang, Cai, & Peng, 2011; Stachour, 1998; Thoits, 2011). Chen et al. (1997) reported findings from a survey of 778 inner-city adolescents (aged 14 to 18) indicating that both individual mental health problems (depression, conduct disorder, and substance abuse) and social environment
(family, friends, and neighborhood) were associated with adolescents' involvement in early sexual activity.

According to Romer et al. (1994), parents and friends are two major influences on adolescents’ risk behaviors. Perceived social support from parents plays a significant role in determining whether adolescents get involved in risk behavior. For example, adolescents who received emotional support from and have a close relationship with their parents are more likely to avoid sexual risky behaviors, such as early sexual debut (Turner et al., 1993). Another study conducted by Brady, Dolcini, Harper & Pollack (2009) found that adolescents with low social support from friends may be at greater risk for engaging in sexual risk-taking, such as frequency of sexual activity and inconsistent use of condom, as a response to life stressors compared to those who reported high levels of peer support. Social support may act as a protective factor against risky behavior among youth by improving mental health (McGinley & Carlo, 2007).

Protective factors, such as family and friends support, can work against the adverse effects of stressful events in different ways. For example, social support may reduce stressful life events, which prospectively predict depressive symptoms (Reinherz, Giaconia, Pakiz, Kendler, Meyers, & Prescott, 2005; Silverman, Frost, and Lefkowitz, 1993). A longitudinal study by Reinherz et al. (1993) also found that social support from family and friends mediated the effects of stressful life events on depressive symptoms; hence this could lead to positive outcomes for the mental well-being of youth and fewer risky behaviors.
Social support may also mitigate the effects of potentially stressful life events through the enhancement of coping performance, which in turn reduces the effects of stressors on health. Social support may foster effective coping strategies and cognitive competencies (e.g., self-efficacy), which, in turn, may facilitate positive adaptation (Murberg & Bru, 2005); whereas a lack of social support may be associated with greater alcohol consumption, drug involvement, and other undesirable outcomes (Schor, 1996; Peterson et al., 2012), leading to more sexual involvement and riskier practices such as unprotected sexual intercourse among youth (Snipes & Benotsch, 2013).

In sum, the literature reviewed above illustrated the negative consequences of poor social support as well as the protective effects of having access to rich social networks and high level of social support on maintaining youth well-being and mental health. The exact mechanisms underlying the positive effects of social support on risky behavior are unknown. There is undoubtedly a complex interplay of various environmental and mental factors that influence the effects of social support on health outcomes. This study postulates that social support is negatively associated with depressive symptoms and stressful life events, which in turn affect sexual risk behavior.

**Contributions to the Literature**

The current study has the potential to make a substantial contribution to the current literature on the relationship between depressive symptoms and risky sexual behavior among adolescents and emerging adults in several ways. First, the findings resulting from this longitudinal study will address a significant gap in the current literature on the relationship between depressive symptoms and risky sexual behavior, as results will add to the extremely limited body of evidence on protective factors for STIs
among both adolescents and young adults. Second, much of the previous research has tended to focus on the direct effects of variables and few attempts have been made to look at the underlying mechanisms that drive this relationship (Bal et al., 2003).

Therefore, more research is needed to unravel and identify the mechanisms underlying the relationship between adolescents’ psychological factors and subsequent development of sexual risk behaviors among young adults. Understanding the associations between these variables provides insight into the mechanism that predisposes individuals to STD/AIDS, and provides information about effective interventions to change such risk behaviors. Specifically, the relationships between stressful life events, depressive symptoms, coping, and sexual wellbeing have not been examined simultaneously, nor has social support been examined as a buffer of this process. The knowledge gained from this study will result in a greater understanding of the relationship between depression and sexual risk behaviors by providing more relevant and accurate information about both protective and risk factors.

Moreover, it is necessary to study the impact of stressful life events and protective factors (e.g., effective coping strategies) on sexual risk behaviors from adolescence to emerging adulthood, in order to inform STI prevention programs targeting adolescents about the importance of helping youth to make a healthy transition to adulthood. In addition, new evidence supporting the linkages between protective and risk factors (e.g., depressive symptoms, social support resources) and sexual risk behaviors beyond adolescence highlights the importance of early intervention program development. If it turns out that adolescents exhibit risk or protective factors for sexual risk behaviors that
persist into young adulthood, it will be possible to design relevant early intervention programs that can have life-long implications for improving their health.
CHAPTER III: METHODOLOGY

This chapter explains the methodology used to conduct this study. A description of data and sample is provided, followed by a description of methods and measures used in analyses. Following the details of the study, an overview of the analytical procedures used in this study will be discussed. Chapter III concludes with a description of how missing data were dealt with in creating the database used for analysis.

The present study was exempted from the Institutional Review Board at the University of Minnesota because it was a secondary analysis of National Longitudinal Study of Adolescent to Adult Health (Add Health) dataset. Documentation of exempt status was obtained in January of 2016 prior to data analysis (See Appendix B).

Data and Samples

Data from three Waves of Add Health were used. These data were ideal for the purpose of this research dissertation because a population of adolescents were followed into adulthood, which allowed researchers to examine the effects of adolescent stressful life events, depressive symptoms, and coping behaviors on sexual well-being in young adulthood. In addition, the Add Health study surveyed a nationally representative sample that is highly generalizable to the whole adolescent population and provides useful insight into the essential predictors of sexual risky behaviors. Further, data collection procedures included all in-home interviews conducted by computer-assisted personal interview (CAPI) for less sensitive questions, and audio computer-assisted personal interview (ACASI) to collect sensitive data such as drug use and sexual activity, which maximizes confidentiality and reduces the potential for biased responses.
The Add Health study currently consists of four waves of data derived from a stratified random sample of 132 junior and senior high schools across the United States. Adolescents from a representative sample of students in grades 7 through 12 along with oversamples of selected populations (e.g., black youth from well-educated families) completed Wave I in-home interviews in 1995 (n = 20,745) when participants were between the ages of 12-18. Wave II interviews were conducted in 1996 (n = 15,000) when respondents were between 13 and 20 years of age. Wave II data included most of the respondents from Wave I; however, the 12th grade students interviewed at Wave I were excluded from the sample, as they exceeded the age eligibility requirement for Wave II (Harris, 2013). Data for the Wave III in-home interviews were gathered in 2001/2002 (n = 15,197) when respondents were aged between 18-28 years old. The fourth Wave of data was collected in 2007-2008, when respondents were aged 24-32. Almost 16,000 of the original respondents were interviewed at Wave IV (Harris, 2013).

In this study, the data from survey participants in Waves I, II and III who were adolescents (aged 13–18 years) in Wave I and II and young adults (aged 18–28 years) in Wave III were analyzed (n = 18,924). Data collection procedures similar to Wave I were conducted for the Wave II and Wave III follow up in-home interviews (Harris, 2013).

**Research Design**

This secondary analysis of longitudinal data utilized structural equation modeling (SEM) as the statistical method to investigate relationships between stressful life events, depressive symptoms, social support and risky sexual behaviors. This method was selected for several reasons. First, SEM has the capacity to examine latent constructs using multiple indicators, further reducing the effects of measurement error (Kline,
SEM’s greatest advantage probably is the minimization of biases imposed by measurement error, which is one of the major limitations of many studies (Beran & Violato, 2010). Stamatis (2012) stated that this error can also be reduced in the SEM by estimating and removing it, providing more accurate estimates of causal relationships. SEM applies scores on the measures that are used in the analysis to develop estimates of latent variables’ scores for each individual. Since these estimates are derived on the basis of the shared variance with other indicators in the analysis, scores on the latent variables are free from the noise of measurement error (Ho, 2006, p.282).

Second, SEM analysis was appropriate because this method provides the ability to examine relationships between three or more variables and to determine the type and strength of relationships. SEM has several advantages over the regression, such as allowing for the inclusion of multiple mediators, multiple predictor variables, a combination of observed and latent measures, as well as multiple outcome variables (Frazier et al., 2004). Complex relationships can be examined by the SEM technique because this technique is the only way to allow simultaneous tests of all relationships (Tabachnick & Fidel, 2001).

Third, SEM also allows for the re-estimation of presumed relationships among variables through post-hoc model modification (Byrne, 1998). The advantage of this approach is that it allows testing of two or more models to determine which has the best fit. Fourth, this secondary data analysis further allowed the researcher to identify direct, indirect and total effects of the explanatory variables on the dependent variables. The investigation of indirect effects is an excellent technique for examining possible mechanisms by which one variable influences or related to another variable (Maruyama,
Within an SEM framework, both direct and indirect effects of the independent variables on the dependent variables can be estimated, as SEM is typically used to capture potential mediating effects on observed associations between variables of interest (Klem, 1995).

**Measures**

**Stressful Life Events**

The occurrence of stressful events was measured by using 11 dichotomous indicators utilized at Wave I and Wave II. This measure is based on the stressful life events list developed by Ge et al. (1994) which later was also used in Add Health study (Adkins et al., 2009). The original measure included 25 stressful life events arising from various life domains, such as family and romantic conflicts, financial hardship, exposure to violence, and the death of family and friend. For the present study, an index was derived from the original index developed by Ge et al. (1994) to measure exposure to stressful life events (see Table 1).

Criteria established by Turner & Wheaton (1995) were used for inclusion of items in stressful life event index. For instance, only acute events of sudden onset and of limited duration that occurred within the past 12 months were included. “Change” versus presumed “undesirability” was used as a basis for events to be included (Turner and Wheaton, 1995, p.35). Most stress theories agree that it is not undesirability of the event per se but the amount of change that requires the balance between demands imposed and resources available and thus may overtax individuals' coping resources (Lazarus & Folkman, 1984; Kaplan, 2013, p.57).
Adolescents were asked to indicate “YES” if they had experienced or “NO” if they had not experienced the stressful events indicated in the survey. These items were organized into the following life domains: history of unintended pregnancy, attempted or committed suicide, was jumped, was shot or stabbed, was injured in a fight, and was suspended/expelled from school (see Table 1). The data were self-reported and only include events that were acute and of sudden onset and occurred over the past year before the in-home interview (Ge et al., 1994; Adkins et al., 2009).

Four items (Q8, Q9, Q10a, and Q10b) were converted to be dichotomous (see Table 1). These scores were then summed so that higher scores on the count of events are indicative of higher levels of stressful events.

Table 1: List of Stressful Life Events Scale (Adapted from Ge et al., 1994)

<table>
<thead>
<tr>
<th>Wave I &amp; Wave II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Have any of your friends tried to kill themselves during the past 12 months?</td>
</tr>
<tr>
<td>Q2. Have any of your family members tried to kill themselves during the past 12</td>
</tr>
<tr>
<td>months?</td>
</tr>
<tr>
<td>Q3. Have any of your family members or friends succeeded in committing suicide in</td>
</tr>
<tr>
<td>the past 12 months? (death of family and friend)</td>
</tr>
<tr>
<td>Q4. Someone <strong>pulled a knife or gun</strong> on you.</td>
</tr>
<tr>
<td>Q5. Someone <strong>shot</strong> you.</td>
</tr>
<tr>
<td>Q6. Someone cut or <strong>stabbed</strong> you.</td>
</tr>
<tr>
<td>Q7. You were <strong>jumped</strong>.</td>
</tr>
<tr>
<td>Q8. In the past 12 months, how often did you run away from home?</td>
</tr>
<tr>
<td>Q9. In the past 12 months, how many times were you in a <strong>physical fight</strong> in which</td>
</tr>
<tr>
<td>you were injured and had to be treated by a doctor or nurse?</td>
</tr>
<tr>
<td>Q10a. Since January 1, 1994, in what month [and year] did you <strong>get pregnant</strong>?</td>
</tr>
<tr>
<td>(Childbearing strains)</td>
</tr>
<tr>
<td>Q10b. Since January 1, 1995, in what month [and year] did you <strong>get pregnant</strong>?</td>
</tr>
<tr>
<td>(Childbearing strains)</td>
</tr>
<tr>
<td>Q11. [If SCHOOL YEAR:] During this school year/[If SUMMER:] During the 1995-1996</td>
</tr>
<tr>
<td>school year {HAVE YOU BEEN/WERE YOU} <strong>expelled from school</strong>?</td>
</tr>
<tr>
<td>(School)</td>
</tr>
<tr>
<td>Q12. [If SCHOOL YEAR:] During this school year/[If SUMMER:] During the 1995-1996</td>
</tr>
<tr>
<td>school year {HAVE YOU RECEIVED/DID YOU RECEIVE} an out-of-school</td>
</tr>
</tbody>
</table>
Depressive Symptoms

Depressive symptoms in the current study were obtained from two time periods, Wave I and Wave II, using a modified version of the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). Specifically, an 18-item version of CES-D was administered to assess the frequency of experiencing depressive symptoms in the past week. Responses were rated as $0 = \text{never or rarely}; 1 = \text{sometimes}; 2 = \text{a lot of the time}; \text{or } 3 = \text{most of the time/all of the time}$. Four positively worded items (e.g., frequency of happiness, whether one enjoys life) were reverse-coded before the score is computed (see Table 2).

Table 2: List of CES-D Items (Wave I & Wave II)

Wave I & Wave II
Q1. How often was each of the following things true during the past seven days? You were bothered by things that usually don't bother you.
Q2. How often was each of the following things true during the past seven days? You didn't feel like eating, or your appetite was poor.
Q3. How often was each of the following things true during the past seven days? You felt that you could not shake off the blues, even with help from your family and your friends.
Q4. How often was each of the following things true during the past seven days? You felt that you were just as good as other people.
Q5. How often was each of the following things true during the past seven days? You had trouble keeping your mind on what you were doing.
Q6. How often was each of the following things true during the past seven days? You felt depressed.
Q7. How often was each of the following things true during the past seven days? You felt that you were too tired to do things.
Q8. How often was each of the following things true during the past seven days? You felt hopeful about the future.
Q9. How often was each of the following things true during the past seven days? You thought your life had been a failure.
Q10. How often was each of the following things true during the past seven days? You felt fearful.
Q10. How often was each of the following things true during the past seven days?
You were happy.
Q11. How often was each of the following things true during the past seven days?
You talked less than usual.
Q12. How often was each of the following things true during the past seven days?
You felt lonely.
Q13. How often was each of the following things true during the past seven days?
People were unfriendly to you.
Q14. How often was each of the following things true during the past seven days?
You enjoyed life.
Q15. How often was each of the following things true during the past seven days?
You felt sad.
Q16. How often was each of the following things true during the past seven days?
You felt that people disliked you.
Q17. How often was each of the following things true during the past seven days?
It was hard to get started doing things.
Q18. How often was each of the following things true during the past seven days?
You felt life was not worth living.

A total score was determined by summing 18 items to produce scores that ranged
from 0 to 54, with higher scores indicating increased severity of depression. The
reliability of the 18-item scale was consistent across Waves I and II of data (α = 0.87, and
0.88, respectively). The total scores were used in the SEM analyses.

Problem-focused Coping Skills

Problem-focused coping was measured by using four items asked at Wave I. For
example, participants were asked to rate their agreement with the statement “When you
have a problem to solve, one of the first things you do is to get as many facts about the
problem as possible” (see Table 3). Responses were measured on a 5-point scale
(1=strongly agree to 5=strongly disagree). The items were reverse coded so that higher
scores denote greater skills. Summing across responses resulted in scores ranging from 4
to 20. Cronbach’s alpha for the problem-focused coping skills measured was acceptable
(α = 0.8).
Unhealthy Coping Strategies

In the current study, substance use was considered as an indicator of maladaptive or unhealthy coping mechanism (Gibson et al., 2011). Following the approach of Zhang (2013) four unhealthy coping strategies were used from the Wave II survey (see Table 3). As a manifest variable, unhealthy behavioral coping was calculated as the sum of the standardized scores of these items, Current drinking was measured by responses to the question, ”During the past 12 months, on how many days did you drink alcohol?” The drinking patterns were divided into seven categories ranged from 1 (Every day/almost every day) to 7 (Never). This item was reverse-coded so that a higher value indicated a higher level of drinking.

Participants were also asked if they currently used marijuana, inhalant, cocaine or other types of illegal drugs. The measure of marijuana involvement was a single item: “During the past 30 days, how many times have you used marijuana?” Possible response ranged from 0 to 200 times. Use of inhalants was measured by the following survey question: “During the past 30 days, how many times have you used inhalants?” Responses ranged from 0 to 30 days. Another question collectively addresses all other illegal drugs including LSD, PCP, ecstasy, mushrooms, speed, ice, heroin or pills without a physician’s prescription: “during the past 30 days, how many times have you used any of these types of illegal drugs? Responses ranged from 0 to 40 times. Measured values were standardized prior to analysis because these variables used differing response scales. Scores were converted to Z-scores according to the following formula: $X_Z = (X - M)/SD$, where X presents an individual measurement, while M represents the mean value, and SD is standard deviation. The total range of scores of these four standard
values was from -1.14 to 48.87. Cronbach's Alpha Coefficient of the scale for unhealthy coping was 0.62, indicating that the scale was reliable.

Table 3: List of Items in Coping Scales

<table>
<thead>
<tr>
<th>Problem-focused Coping Skills</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. After carrying out a solution to a problem, you try to think about what went right and what went wrong (<em>Strongly agree to Strongly disagree</em>).</td>
<td></td>
</tr>
<tr>
<td>Q2. When making decisions, you generally use a systematic method for judging and comparing alternatives (<em>Strongly agree to Strongly disagree</em>).</td>
<td></td>
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<tr>
<td>Q3. When you have a problem to solve, one of the first things you do is to get many facts about the problem as possible (<em>Strongly agree to Strongly disagree</em>).</td>
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<tr>
<td>Q4. When you are attempting to find a solution to a problem, you usually try to think of as many different ways to approach the problem as possible (<em>Strongly agree to Strongly disagree</em>).</td>
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<table>
<thead>
<tr>
<th>Unhealthy Coping Strategies</th>
<th></th>
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<tbody>
<tr>
<td>Q1. During the past 12 months, on how many days did you drink alcohol? (<em>Never to Nearly every day</em>)</td>
<td></td>
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<tr>
<td>Q2. During the past 30 days, how many times have you used marijuana? (<em>0 to 200 times</em>)</td>
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<tr>
<td>Q3. During the past 30 days, how many times have you used inhalants? (<em>0 to 30 days</em>)</td>
<td></td>
</tr>
<tr>
<td>Q4. During the past 30 days, how many times have you used any of these types of illegal drugs? (<em>0 to 40 times</em>)</td>
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Perceptions of Social Support from Family and Friends

Measures of social support were constructed using seven items measured at Wave I; more specifically, five items assessed family support (e.g., "Most of the time, your mother is warm and loving toward you."), and two items assessed support from a friend (e.g., Did you talk to {FRIEND} about a problem during the past seven days?).

Items on the family social support scale were rated from 1 (*not at all*) to 5 (*very much*). Most items appear on perceived social support from family members were identical in wording, apart from change in the referent of the statement (e.g., “*Most of the time, your mother is warm and loving toward you*” vs. “*Most of the time, your father is warm and loving toward you*”). Table 4 provides the exact wording for each
question/statement. Responses ranged from 1 (not at all) to 5 (very much), with high scores indicating a high level of social support availability. Scale items 3 (“Most of the time, your mother is warm and loving toward you”), 4 (“Most of the time, your father is warm and loving toward you”) and 5 (“When you do something wrong that is important, your mother talks about it with you and helps you understand why it is wrong”) were reverse-scored to be consistent with the other items (i.e., higher scores are indicative of higher levels of perceived social support). Scores on all items were converted to z scores, because items used different rating scales. The construct validity of family social support scale was established using factor analysis. Any item with a factor loading above 0.6 was included in the scale. As a result of factor analysis, a 5-item scale was constructed to measure social support received from parents. In the present study, the internal consistency was 0.72 for the family support subscale.

The two items making up the friends’ social support composite were answered on a binary response scale with the categories yes (1) and no (0). The total summed score was used to measure social support, ranging from 0 (no perceived support) to 2 (maximum perceived support). Due to the fact that only two variables comprised the friends support scale, Pearson’s r was used as a measure of covariance for the scale, rather than Cronbach’s alpha, which is only appropriate for scales that have at least three items (Sainfort & Booske, 2000). The two indicators for the friends support subscale correlated at $r = .40$, $p < .001$. 
Table 4: List of Items in Social Support Scale

**Family Members**
Q1. How much do you think she cares about you? *(Not at all to Very much)*
Q2. How much do you think he cares about you? *(Not at all to Very much)*
Q3. Most of the time, your mother is warm and loving toward you. *(Strongly agree to Strongly disagree)*
Q4. Most of the time, your father is warm and loving toward you. *(Strongly agree to Strongly disagree)*
Q5. When you do something wrong that is important, your mother talks about it with you and helps you understand why it is wrong. *(Strongly agree to Strongly disagree)*

**Friends**
Q1. Did you talk to {1st Female FRIEND} about a problem during the past seven days? *(Value 0-1)*
Q2. Did you talk to {1st Male FRIEND} about a problem during the past seven days? *(Value 0-1)*

*Outcome Measures*

**Sexual Risk Behaviors:** Any kind of sexual activity that brings an uninfected person in contact with semen, blood, or vaginal secretions of an already infected person with STIs puts that person at risk for infection (Sabin et al., 2014, p.451). For this reason, consistent use of condoms is a critical target behavior. Condom use is not, however, 100% effective in prevention of the acquisition of STIs, particularly viral pathogens, such as herpes simplex virus and human papilloma virus (HPV) (Fethers et al., 2008; Holmes, Levine & Weaver, 2004). The risk of STIs acquisition from inconsistent condom use would become greater with larger number of sexual contacts, especially if occurring with multiple sexual partners (Beadnell et al., 2005). Transmission of STIs is highly associated with both the number of sexual partners and the number of sex acts per partner; increases in one or both enhance the likelihood of persistence of the STIs within a community (Aral & Leichliter, 2010; Kraut-Becher & Aral, 2003).
Therefore, in this analysis, sexual risk behavior was a latent construct, in which three observed variables at Wave III were used as indicators of the latent factor: **condom use at last sexual intercourse**, having **multiple sexual partners** in the preceding years and the **frequency of sexual intercourse**. **Condom use at last sexual intercourse** was measured by the following survey item: “The most recent time you had vaginal intercourse did {YOU/YOUR PARTNER} use a condom?” The values were coded as a binary variable; 1 = yes and 2 = no. Having **multiple sexual partners** was measured by the following question "With how many different partners have you had vaginal intercourse in the past 12 months." The values range between 0 and 100. **Sexual frequency** was measured by one single question: “In the past 12 months, how many times have you had vaginal intercourse in the past 12 months?” Responses were numerical and ranged from 0 to 900. All participants were included in the analyses, regardless of sexual activity status at Wave III.

In the hypothesized models, use of condom at last sexual intercourse, multiple sexual partners, and frequency of sexual intercourse are the main “dependent” or “endogenous variables” (Figure 2, 3, 4, 5, and 6). Exogenous variables are those that are not influenced by other variables within the model (variables without causal arrows). For example, depressive symptoms Wave I and stressful life events Wave I in Figure 2, coping strategies in Figure 5 and social support in Figure 6 are exogenous variables. In Figure 1 (Hypothesis 1a), depressive symptoms and stressful events variables are considered as partially exogenous—partially but not wholly determined by the values of each other in the model.
STI: The laboratory-confirmed *STI outcome variable* was determined from data at Wave III. Urine specimens were used to test for STIs including chlamydia, gonorrhea, and trichomonas infections. About 8% of the eligible participants refused to submit a urine specimen for testing. Because of the product recall by the test manufacturer, an additional 6% of Neisseria Gonorrhea test results were excluded (Cohen et al., 2003). Thus, the STI outcome variable was measured by a composite variable that combined the results of urine specimens (positive chlamydia, positive gonorrhea, and positive trichomonas infections) (Kaestle et al., 2005). The composite variable of STI ranged from 0 to 3. The measure was also dichotomized in the descriptive analysis of the prevalence of STI.

Covariates: Covariates were included in SEM models to test if the relationships with outcome measures were independent of demographic characteristics. In SEM, a covariate is frequently considered as an exogenous variable with direct effects on the dependent and the endogenous variables (Kline & Santor, 1999). Based on the previous review of the literature, age, gender, race/ethnicity, SES, and family structure were included in all SEM models as control variables but they are not shown in figures in order to more clearly illustrate the primary findings.

*Age* was a continuous measure in years, determined from the participant’s date of birth and the date of the interview at Wave 1. Age at Wave I was calculated using the codes and formula provided by the Add Health team (Harris et al., 2009). *Gender* was a dichotomous indicator, with 1 denoting male and 2 denoting female. Socio-economic variables included *parents’ highest education*, determined by taking the highest level of
education obtained by either father or mothers at Wave I and *parental annual income* in the past year at Wave I. The original responses for *parental annual income*, participant’s individual earnings in 1995, ranged from $0 – $999,000. For the present study, a nominal, four-level categorical variable was constructed for the parents’ highest education: less than high school, high School graduate or GED, some college, and four-year college or higher.

Two questions from Wave I were used to determine *race/ethnicity*. First, participants were asked “What is your Race?” Response choices included White, Black or African American, American Indian or Native American, Asian or Pacific Islander, or Other. Second, Hispanic ethnicity was asked in a separate question, “Are you of *Hispanic or Latino origin*?” If participants responded “yes” to the question “Are you of *Hispanic or Latino origin*”, the respondent was marked as Hispanic and eliminated from any race category that was marked. In this study, the categories of race and ethnicity are collapsed into one category called ethnicity. The ethnicity variable was also dichotomized for descriptive purposes (0 = Nonwhite, 1 = white) (see Table 9).

*Family structure* was collected at Wave I to determine if the household was a two-parent family (coded 1) versus all other types of family structures (coded 0). Family structure was used as a covariate on sexual behavior outcomes because it appears to have an effect on the risk-taking behavior of youths (Bakken & Winter, 2002).
Analytic Strategy

This section involves a discussion of analytic strategy and the statistical tests that are used to achieve the specific aims of this study. The subsequent sections describe sampling weights, descriptive analyses, procedure, and screening for normality.

Sampling Weights

Sampling weights were applied in all analyses. The Add Health study was based on a cluster sample in which clusters were sampled with unequal probability. For several reasons, including improving reliability and precision of epidemiologic estimates, the Wave I Add Health dataset oversampled for certain subgroups (Chen & Chantala, 2014). Appropriate analytic methods should be used to adjust for oversampling; otherwise the analytical sample is not representative of the true population from which the initial sample was selected. The Add Health study contains sampling weights to account for the oversampling of minority groups. The purpose of “sample weights” is to readjust the sample to be representative of a larger population. Failure to apply sample weights can result in inaccurate parameter estimates (i.e., estimates of totals, proportions, and associations) biased toward the oversampled members of the population (Harris, 2013; Chen & Chantala, 2014).

The in-home Wave I sample represented the pool of respondents eligible for re-interview at each follow-up Wave. The overall response rates for the Wave I, Wave II, and Wave III in-home surveys were 78.9%, 88.2% and 77.4% of the original sample, respectively (Harris, 2009b). A sizable portion of the initial respondents were not re-interviewed due to unavailability, refusal, death or age ineligibility (e.g., not reached age
18 by Wave III data collection); as a result, the attrition of the respondents may also influence the estimates of the current study. The Add Health Study also included sampling attrition weights appropriate for nonresponse adjustment (Chen & Chantala, 2014).

Add Health contains sampling weights for each Wave of data collection. Wave I only provides a sample weight (GSWGT1). Wave II and Wave III contain a combination of sample and attrition weights (GSWGT2-GSWGT3). For example, GSWGT3 not only adjusts for the estimates so that they are representative of the U.S. population, but it also adjusts for attrition between Waves I and III (Chen & Chantala, 2014). In the proposed study, only respondents who had valid sampling weights at Wave I (GSWGT1) were included (N = 18,924). Sampling weight was accounted for by including a “WEIGHT IS” statement in the Data command in Mplus (Muthen & Muthen, 1998-2015, p.481).

Procedures

Data were analyzed using statistical software programs STATA IC 14 (College Station, TX, USA) and Mplus7® (Muthén & Muthén, 2007). STATA IC 14 was used to generate descriptive statistics, frequencies, and scale reliability coefficients. SEMs were conducted using Mplus7® to generate measurement and structural models for path analysis (Muthén & Muthén, 1998-2015). Mplus could effectively handle the complex design of Add Health, and allowed for the computation of standard errors and a chi-square test of model fit that takes into account clustering and sampling weights (Muthén & Muthén, 1998-2015, p.6). The following discussion details the processes used to conduct the descriptive and structural equation analyses of the study data.
Descriptive Analysis

Demographic variables, such as race/ethnicity, socioeconomic status, and age were examined to determine if they were related to social support, coping strategies, depressive symptoms, stressful life events and three risky sexual behaviors—nonuse of condom, having multiple sexual partners and frequency of sexual intercourse— and one possible outcome of those behaviors, having positive history of STIs (see Table 7). Population means for the continuous variable (e.g., age) and the proportions for categorical variables (e.g., race/ethnicity, depressive symptoms categories) were calculated to describe the full sample and the subsamples of respondents (e.g., gender differences).

Pearson chi-square tests for independence (categorical variables) or z-tests for independent samples (continuous variables) were conducted to assess differences in demographic characteristics between male and female groups. The Z-test was used in this study (instead of t-test) because this test is used with larger sample sizes, as in the case of this study (Sharm, 2015, p.437).

Because the data were not normally distributed, a non-parametric test, namely Spearman’s rank correlation test, was used to analyze the bivariate relationships between variables, (McDonald, 2014; Mukaka & Malawi, 2012). Demographic variables of interest (e.g., age, SES, and race/ethnicity) were also included in the correlation analysis. For all correlation analyses, the research assumed an alpha level of 0.05, indicating that the probability of rejecting a true null hypothesis would be no more than 5% of the time (Atluri, 2005, p.139).
**Screening for Normality**

Initial data checking assessed the presence of outliers, univariate and multivariate normality. These assumptions were evaluated via the examination of skewness and kurtosis values and Mardia’s normalized estimates (Bentler, 2005).

Conventional maximum likelihood estimation and confirmatory factor models assume multivariate and univariate normality for variables used in path analysis (Allison, 2015; Little, 2013, p.17). Therefore, prior to analyses, the normality of measured outcome variables was checked through scrutinizing skewness and kurtosis of the variables, with no values exceeding an absolute value of 3 and 10, respectively (Kline, 1998, p.82). This study used a binary variable (i.e., condom use at last sexual intercourse), which was not normally distributed. Histograms and box plots were also examined to assess the normal distribution of the study’s variables used to create the outcome variables within the dataset. At the univariate level, poorly distributed continuous variables were also identified through skewness and kurtosis indices. Specifically, the number of sexual partners, frequency of sexual intercourse, STI, depressive symptoms and stressful life events at Wave II were found not to be normally distributed during univariate normality checks (see Figure 10). The effect of outliers on the estimated parameter values was examined by performing the parameter estimation calculations twice, once with the outliers included in the data set and once without it. Outliers were ignored if they had little or no effect on the model parameters (Bakker & Wicherts, 2014).
At the multivariate level, deviations from normality can be detected by examining estimates such as Mardia’s multivariate skewness and kurtosis. In general, Mardia’s normalized multivariate kurtosis value should be in the +3 to -3 range (Bentler, 2005). Mardia’s tests of skewness and kurtosis were used to check for multivariate normality by using STATA syntax. Mardia’s normalized estimates (Mardia Kurtosis > 3, \( p < 0.001 \)) detected significant multivariate non-normality in the data (Bentler, 2005).

Mplus has incorporated several model-based approaches to deal with non-normality. The Robust Weighted Least Squares Mean and Variance adjusted estimator (WLSMV) provides unbiased estimates of standard errors without requiring normal distribution of variables. WLSMV takes into account non-independence of observations.
obtained under cluster sampling (Kline, 2005). If the model includes one or more categorical indicator variables or if there is extreme non-normality, WLSMV is appropriate to use (Muthen & Muthen, 1998–2011, p.638). Maximum Likelihood Robust (MLR) parameter estimates with standard errors and a chi-square test statistic are also robust to non-normality and non-independence of observations when used with TYPE=COMPLEX. MLR was chosen to evaluate the hypothesis 1a because WLSMV can be used with only combinations of categorical and continuous outcomes (see Table 5). Therefore, when there is no categorical outcome in the model, Mplus does not allow WLSMV estimator to estimate SEM models and uses ML as the default estimation method (Muthen & Muthen, 1998–2011).

**Table 5: Analytic Strategy by Specific Aim**

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<thead>
<tr>
<th>Aim</th>
<th>Tests</th>
<th>Estimation Used</th>
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<tr>
<td>Specific Aim 1</td>
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<tr>
<td>Hypothesis a</td>
<td>Bidirectional Relationships</td>
<td>MLR*</td>
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<tr>
<td>Hypothesis b</td>
<td>Mediation Effect</td>
<td>WLSMV**</td>
</tr>
<tr>
<td>Hypothesis c</td>
<td>Mediation Effect</td>
<td>WLSMV</td>
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<tr>
<td>Specific Aim 2</td>
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<tr>
<td>Hypothesis a</td>
<td>Direct &amp; Indirect Effects</td>
<td>WLSMV</td>
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<tr>
<td>Hypothesis b</td>
<td>Mediation Effect</td>
<td>WLSMV</td>
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<tr>
<td>Specific Aim 3</td>
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<tr>
<td>Hypothesis a</td>
<td>Direct &amp; Indirect Effects</td>
<td>WLSMV</td>
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<td>Hypothesis b</td>
<td>Direct &amp; Indirect Effects</td>
<td>WLSMV</td>
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<td>Hypothesis c</td>
<td>Direct &amp; Indirect Effects</td>
<td>WLSMV</td>
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<tr>
<td>Hypothesis d</td>
<td>Direct &amp; Indirect Effects</td>
<td>WLSMV</td>
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* Maximum Likelihood with Robust Standard Errors  
** Weighted Least Squares Variance Adjusted

**Path Modeling Procedures**

The SEM modeling procedure involved four stages: specification, estimation, modification, and evaluation. The first stage involved the specification of hypothesized models for testing. In the estimation stage, a fitting function was selected and parameter
estimates were obtained for each model. In the evaluation stage, the test of model fit and other indices of fit were interpreted. In the modification stage, the original model was modified in accordance with the information obtained in the previous stage as well as theory (Choo, 2005). Each of these procedural steps is discussed in the following section, along with a discussion of modeling mediating variables.

Model Specification: A Model of the Impact of Adolescent Mental Health on Sexual Risk Behaviors in Young Adulthood

SEM is an a priori theory approach, which means that the specified models must be grounded on previous research and/or theory. At the model specification stage, hypothesized relationships among the observed and latent factor were described. For the current study, these relationships were specified in the form of equations in the software package, Mplus, in which model parameters were defined and estimated to determine the relationships and fit among observed variables and latent factors based on the data provided. Relationships among variables are represented by paths.

The initial examination of the loadings of each observed indicator on the latent construct, sexual risk behavior, suggested that the frequency of sexual intercourse indicator be dropped from the analysis because its R-square (0.008, p = 0.10) was less than half of those of remaining indicators (condom use at last sexual intercourse, 0.15; number of sexual partners, 0.21). Thus, only condom use at last sexual intercourse and the number of sexual partners were included in the sexual behavior latent construct for further analysis.
It is important to mention that a model may still be identified even if there are fewer than two indicators per latent variable. According to the *three-indicator “rule”*, for a model to be identified, at least three or more observed indicators are needed for each latent construct (Meyers & Gamst, 2006, p.977). However, this rule does not necessarily correspond to what all previous researchers considered as an optimal number. For example, Bollen (1989) established a *two-indicator rule* for identification of CFA models. As Bollen (1998) noted, a model will be identified if every latent construct has at least 2 or more indicators. Kline (2005) suggested that the appropriate number of indicators per latent variables depends on the total sample size, that is, larger samples are less likely to generate estimation problems on models with only two indicators per latent construct (Kline, 2005, p.172).

*Model Estimation*

*Mplus* provides ML for estimation of continuous, binary, ordinal, or combinations of these variable types. Robust standard errors and chi-square are available for all outcomes using the ML estimator (Muthén & Muthén, 1998-2015, p.435). However, Weighted Least Squares Variance Adjusted (WLSMV), a robust estimator, also provides an appropriate method for estimating SEM models that contain non-normal variables and categorical data (Brown, 2006). Given the skewness of the available data and the fact that one variable (i.e., condom use at last sexual intercourse) is not continuous, WLSMV and MLR seem more appropriate for the purpose of the current study. Further, when sample size is larger than 250, robust maximum likelihood and WLSMV performed similarly regardless of level of skewness (Muthén & Muthén (1998-2015, p.20).
One main reason for choosing WLSMV over MLR is the fact that chi-square and related fit indices for SEMs with categorical outcomes are only available for WLSMV estimator. The CATEGORICAL option was used to specify the measure of condom use as a binary variable in the model and its estimation. In addition, complex survey capability available accounting for clustering in Mplus, the “CLUSTER IS” statement, was used to estimate models appropriately (Muthen & Muthen, 1998–2011, p.714).

Model Modification

The modification index (MI) method was used to identify possible model-modifications to generate a better fitting model. The MI test or Lagrange multiplier test suggests the addition of potentially significant paths and the deletion of non-significant ones (p > 0.05). Modification indices (MIs) indicate parameters that can be added to a model to improve fit. All MI information is based on making only one change at a time. Nevertheless, no change was made unless it could be theoretically justified. Correlated error terms were added only when there were theoretical justifications for their incorporation into a model (Kenny, 2011). In Mplus, modification index values were requested by including MODINDICES option in the OUTPUT command (Muthén & Muthén, 1998-2015, p.468).

Model Evaluation

In this study, the SEM models were composed of two components: confirmatory factor analysis (CFA) and path analysis. A CFA was performed to test the hypothesis that a relationship between observed variables and underlying variables exists. The CFA requires research or theory to establish a relationship pattern a priori that is then tested
statistically. The CFA model was tested using WLSMV estimation, and it was used to create and confirm the measurement model of sexual risk behavior. Both CFA and path models rely on goodness-of-fit statistics to determine the fit of models to the data.

Fit Indices: A variety of alternative goodness-of-fit indices were used to evaluate model fit of hypothesized path models in the current study. First, one of the first fit indices introduced into SEM is the traditional chi-square test. The null hypothesis for the chi-square test is that the model fits the population data perfectly. Therefore, a statistically nonsignificant chi-square is indicative of overall satisfactory model fit, because an insignificant result suggests that the null cannot be rejected. The lower the Chi-square value means the better the model fit.

Second, the Comparative Fit Index (CFI) also assesses the goodness of model fit. CFI values range from 0 to 1, with higher values indicating better model fit (Brown, 2005). More specifically, values above 0.95 are considered to have acceptable model fit and values below 0.90 indicate poor model fit (Cheung & Rensvold, 2002; Schermelleh-Engel, Moosbrugger, & Müller, 2003). Third, Tucker-Lewis Index (TLI) is usually evaluated similarly to CFI, with values closer to 1 indicating good model fit (Brown, 2006). Finally, the Root Mean Square Error of Approximation (RMSEA) has been recognized as one of the most widely used measures of fit in structural modeling. RMSEA of 0.08 or below indicates reasonable fit in the measurement model (Kline, 2005; Schermelleh-Engel, Moosbrugger, & Müller, 2003). An ideal RMSEA value for a model is 0.00, while a value of less than 0.05 is indicative of very good fit and values between 0.09-0.1 indicate a good fit (Byrne, 2001, p.85).
The goodness-of-fit of a model to data is an important criterion for evaluating the model but it does not necessarily imply the model is the correct one. Assessment of the path coefficients and their significance, termed the plausibility criterion, also provide an important criterion for determining the superiority of one model (Joreskog & Sorbom, 1994).

**Plausibility Criterion:** According to this criterion, the plausibility of a model is explored by examining path coefficients in terms of their magnitude, their significance, as well as in their expected direction (Joreskog & Sorbom, 1994). In regard to the magnitude of correlation coefficients, a zero correlation indicates that variables have no relationships; correlations < 0.2 are considered weak; 0.21 to 0.4, moderate; and > 0.5, strong (Cohen, 1988).

The plausibility criterion is used in making judgements about adherence of the path coefficients to the theoretical assumptions underlying a model and to the hypotheses. This adherence should hold true in terms of magnitude, significance, and the expected direction. Hence, a model may fit the data well, but it does not reasonably fit the data because of many theoretical paths that do not support the theoretical arguments of the model. In other words, there should be some balance between fit indices and the theoretical argument with regard to the relationships among research variables to meet this criterion (Vigoda & Cohen, 2004, p.72-73). Therefore, in the current study, two methods were used to determine if theoretical predictions or hypotheses were supported: assessment of both path coefficients and fit indices in each of the models.
Coefficient of Determination (R2): R-square is the amount of variance in the endogenous latent constructs that is explained by all the exogenous ones. The total variance of a model indicates how much the dependent variable can be explained by the group of independent variables in the model. The coefficient of determination takes on values ranging from 0 to 1, with higher values indicating more levels of predictive accuracy. The R-squared can be used to compare models as new variables are added. Currently, Mplus is not able to yield the R-square value for the total variance of a model. This is mainly because the focus of factor analysis in Mplus is to explain correlation rather than variance. However, if the STANDARDIZED option is added to the OUTPUT command statement, an $R^2$ value is reported for each observed and dependent variable. In this study, the total variance was calculated by summing of the squared loadings for all variables, dividing by the total number of variables, and multiplying by 100 (Rummel, 1967).

Subgroup Analysis

A subgroup analysis of all models by gender was conducted, and results can be found in Appendix A. Although the study was not designed to test gender differences, all analyses were repeated to investigate possible gender differences in hypothesized models. Accordingly, for each hypothesis a single-group model was run first, and then separate models were examined in which all parameters were estimated separately for males and females.
Mediation Models

A mediator or mediating variable is defined as a third variable that could potentially explain the relationship between a predictor and an outcome variable (Baron & Kenny, 1986; Judd & Kenny, 1981). For example, considering stressful life events as a mediator (in Hypothesis 1b) means that depressive symptoms create and generate stressful events themselves and these stressful life stressors may explain the relation between depressive symptoms and risky sexual behaviors.

Analytic Procedure for Mediation Models

The mediator variables examined in the study are stressful events at Wave II, depressive symptoms at Wave II, and unhealthy coping strategies at Wave II. In the current study, mediation was assessed through the calculation and significance testing of indirect effects (Preacher & Hayes, 2008). As described by Baron & Kenny (1986) and MacKinnon (2008), path models can be carried out to investigate direct and indirect effects of the mediating variable, M, on the relation between an independent variable, X, and an outcome, Y (see Figure 11). Path models also made it possible to control for socio-demographic characteristics.

The total effect of X and Y may be defined as the effect of the independent variable on the outcome when paths involving the mediator are set to zero. The indirect effect \((a \times b)\) is defined as the effect of a predictor X on the outcome through the mediator (M), that is, a variable between the predictor and outcome. The direct effect \((c')\) is the effect of the independent variable on the outcome when the path model is not mediated. Mediated effects can be considered either partial or full. Partial mediation is the case in
which statistically significant indirect and direct effects are observed (i.e., c' path that represents the direct path is reduced in magnitude but is still significant). Full mediation is the case in which c' path becomes statistically nonsignificant, but the indirect effect is observed (Baron & Kenny, 1986).

Figure 11: Total (c), Indirect (a * b), and Direct Effects (c') in Mediation Analysis

Multiple regression or structural equations modeling (SEM) are two common ways of testing mediation effects. The logic behind these two approaches to mediation analysis is the same, but SEM is the preferred method for such analysis (Baron & Kenny, 1986; Judd & Kenny, 1981; Kenny, Kashy & Bolger, 1998). SEM is an efficient means of testing mediation because it provides a practical way to control over the measurement error problem in tested models (Galmonte, 2015, p. 372) and allows for computation of direct effects through inclusion of third variables (Hoyle & Smith, 1994). Mplus (Muthen & Muthen, 1998-2015) estimates both total and specific mediated effects, along with
their confidence intervals (CIs) and their standard errors (SEs) using a variety of methods including bootstrap.

The bootstrap method is more appropriate when data have a non-normal distribution (Shrout & Bolger, 2002). However, since the BOOTSTRAP option is not available with TYPE=COMPLEX to estimate standard error for the indirect effect, the BOOTSTRAP option with replicate weight was applied to test significance of the total and specific indirect effects in Mplus. The BOOTSTRAP option with weights is only allowed with TYPE=COMPLEX when replicate weights are present or when REPSE=BOOTSTRAP is requested. Replicate weights can be used for complex survey data sets to compute the standard errors (Asparouhov & Muthen, 2010). This approach is also recommended when the mediator or outcome measures are not normally distributed (Shrout & Bolger, 2002). Because the measures of condom use at last sexual intercourse, the number of sexual partners, and frequency of sexual intercourse were not normally distributed, the bootstrapping procedures were used to test for mediation.

Several studies have used the bootstrap method to examine indirect relationships (Cheung & Lau, 2007; Major et al., 2008). The bootstrapping is a procedure where a large number of random samples are achieved from the data and then the indirect effect is computed for each sample (Major et al., 2008). The bootstrapping sampling distributions of these indirect effects serve as an empirical approximation of the sampling distribution of the indirect effect. This bootstrapped sampling distribution is then used to construct confidence intervals for the indirect effect (Preacher & Hayes, 2008).
However, this technique does not allow researchers to test an overall model fit because fit indices including chi-square are not available with replicate weights in Mplus. In order to obtain fit statistics, all mediation analyses were first run without the BOOTSTRAP option, and then all the standard errors reported were generated by bootstrapping with 200 repetitions, which provided a 99% confidence interval of any direct or indirect effects. Therefore, this study used the results from the bootstrapped standard errors along with the non-bootstrapped fit statistics to evaluate model fit for models involving indirect effect or using mediation analysis.

Confidence intervals and approximate standard errors were requested by including CINTERVAL (BCBOOTSTRAP) option in the end of OUTPUT command. For the interval test, the upper and lower confidence limits are estimated. If the confidence interval does not include the value of 0, the estimated indirect effect is considered significant.

**Missing Data**

Nearly all modern methods of data analysis assume that, after adjustment for available covariate information, the missing data are missing at random (MAR); therefore, the pattern of missing values, in this paper, was assumed to be MAR. The MLR estimation technique utilizes full information maximum likelihood (FIML) procedure for handling missing data. By default, Mplus deals with missing data by implementing FIML estimation, using all available information to estimate each model parameter. Mplus provides FIML for binary, nominal, continuous, count, or combinations of these variables (Lee, 2011).
When no covariates are present in the model, the WLSMV estimator uses pairwise present for dealing with missing if TYPE=MISSING statement is used in the ANALYSIS command; when there are covariates, missing-ness becomes a function of observed covariates but not the observed outcomes (Muthén & Muthén, 1998-2015, p.489). Missing data are handled the same way for all outcomes when using WLSMV, regardless of whether the predictors are continuous or categorical.
CHAPTER IV: ANALYSIS

Chapter IV contains the study findings. First, demographic characteristics are provided followed by presentation of findings related to each specific aim. Results for each specific aim are reported in the order that criteria for assessing model fit were discussed first. After providing all information on fit indices and plausibility criteria, the statistical significance of each parameter are presented. As the last step in the analysis, modification indices are examined, if needed, in order to increase the strength of the data fit, and ultimately a conclusion was made to accept or not to accept the alternative hypothesis.

Descriptive Analysis

Descriptive statistics for each variable were calculated. They included the mean, standard deviation, proportions, and frequencies. All descriptive analyses were conducted using STATAIC 14.00 (Stata Corp, College Station, TX, 2015) to account for the complex nature of the sample design, and to allow estimation of standard errors in the presence of clustering. Incorporating sampling weights allowed for unbiased estimates of coefficients, whereas incorporating clusters produced unbiased estimates of the standard errors (Kiecolt & Nathan, 1985). Since data were weighted, results are nationally representative for the adolescent population in the United States.

Participants

Table 6 provides an overview of the study sample. The weighted data utilized in the current study consisted of 18,924 students (7th – 12th graders) attending school between 1995 and 2000. More than half of the respondents were male (51 percent), with
mean ages of 15.5 (SD = ± 1.70) and 21.80 (SD = ± 1.71) at Wave I (in the 1994-1995 school year) and Wave II (2001-2002), respectively.

In terms of racial/ethnic identification, more than two-thirds of the participants identified themselves as White (71 percent), 14 percent as African-American, 11 percent as Hispanic, 3 percent as Asian, and 1 percent as “other” ethnic group (which includes American Indian or Native American). The sample comprises about 53 percent of adolescents who grew up in a two-biologic parent family, and almost 40 percent of parents were high school graduates (or had a GED).

This paragraph describes the outcome variable at Wave III when participants were on average 22.50 years of age. The sexual risk behavior construct is composed of two indicators. One is “condom use at last sexual intercourse”. Thirty-two percent of the participants reported having used a condom at their sexual intercourse, whereas 46 percent reported not having used a condom during their most recent sexual intercourse. Twenty-nine percent of females and 37 percent of males used condoms at last sexual intercourse; significant difference was observed between males and females (p < 0.001). Another indicator is “number of sexual partners in past year”. The average number of sexual partners for males and females were 1.7 (SD = ±2.5) and 1.3 (SD = ±1.5) partners, respectively. There was also significant difference between males and females in terms of number of sexual partners in the past year (p < 0.001).

About 5 percent of males and almost 7 percent of females had tested positive for Chlamydia, *N gonorrhoeae* or *C trachomatis*. The prevalence of a positive test result for STI was higher among young adult females than males (p < 0.001) (see Table 7).
The mean number of stressful life events reported by the total sample was 0.60 (SD = ±1.2) and 0.52 (SD = ± 1.10) for Wave I and Wave II, respectively. The mean CES-D scores for Wave I was 10.03 (SD = ± 0.17) and 10.23 (SD = ± 0.19) for Wave II (Table 7). For the adolescents within this study the average problem-focused coping scores was 15.08 (SD = ± 2.50). Z tests for comparing means indicated that there were no gender differences on overall scores on the problem-focused coping skills scale (p > 0.05). The scale for family support had a mean of 0.19 (SD = ± 0.07). A summary of these results are illustrated in Table 7.

Table 6: Demographic Characteristics of Study Sample (n = 18,924)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>Percent (%) (weighted)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>9,635</td>
<td>51</td>
</tr>
<tr>
<td>Female</td>
<td>9,286</td>
<td>49</td>
</tr>
<tr>
<td><strong>Family Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>2,164</td>
<td>17</td>
</tr>
<tr>
<td>20,000-40,000</td>
<td>4,936</td>
<td>27</td>
</tr>
<tr>
<td>≥41,000</td>
<td>10,823</td>
<td>56</td>
</tr>
<tr>
<td><strong>Parents’ Highest Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>1,971</td>
<td>27</td>
</tr>
<tr>
<td>High School graduate or GED</td>
<td>2,832</td>
<td>39</td>
</tr>
<tr>
<td>Some college</td>
<td>1,005</td>
<td>13</td>
</tr>
<tr>
<td>Four-year college or higher</td>
<td>1,445</td>
<td>19</td>
</tr>
<tr>
<td><strong>Racial/Ethnic Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>13,408</td>
<td>71</td>
</tr>
<tr>
<td>African American</td>
<td>2,643</td>
<td>14</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2,077</td>
<td>11</td>
</tr>
<tr>
<td>Asian</td>
<td>566</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>245</td>
<td>1</td>
</tr>
<tr>
<td><strong>Family Structure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-bioparent family</td>
<td>10,092</td>
<td>53</td>
</tr>
<tr>
<td>Other</td>
<td>8,831</td>
<td>47</td>
</tr>
</tbody>
</table>
### Table 7: Mean Differences, Standard Deviations, and Proportions for Study Variables (n = 18,924)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean (±SD)</th>
<th>Percent (%)</th>
<th>Mean (±SD)</th>
<th>Percent (%)</th>
<th>Mean (±SD)</th>
<th>Percent (%)</th>
<th>Tests $^2$ for Gender Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE $^3$ (WI)</td>
<td>0.60 ± 1.20</td>
<td>0.83 ± 1.20</td>
<td>0.65 ± 1.40</td>
<td>Z = 13.40*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE (WII)</td>
<td>0.52 ± 1.10</td>
<td>0.75 ± 1.20</td>
<td>0.55 ± 0.95</td>
<td>Z = 13.30*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CES-D $^4$ (WI)</td>
<td>10.03 ± 0.17</td>
<td>10.1 ± 1.8</td>
<td>11.93 ± 2.20</td>
<td>Z = 17.43*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CES-D (WII)</td>
<td>10.23 ± 0.19</td>
<td>9.8 ± 1.8</td>
<td>11.85 ± 2.80</td>
<td>Z = 16.60*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem-focused Coping Skills (WI)</td>
<td>15.08 ± 2.50</td>
<td>15.1 ± 2.50</td>
<td>15.06 ± 2.40</td>
<td>Z = 3.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unhealthy Coping (WII)</td>
<td>-0.03 ± 0.07</td>
<td>0.03 ± 1.20</td>
<td>-0.05 ± 2.90</td>
<td>Z = 4.56*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Social Support (Wave I)</td>
<td>0.19 ± 2.07</td>
<td>0.29 ± 2.20</td>
<td>0.09 ± 2.03</td>
<td>Z = 11.51*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friends Social Support (Wave I)</td>
<td>-0.05 ± 0.09</td>
<td>-0.57 ± 0.03</td>
<td>0.49 ± 0.01</td>
<td>Z = -73.58*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Partners (WIII)</td>
<td>1.43 ± 0.04</td>
<td>1.70 ± 2.50</td>
<td>1.30 ± 1.50</td>
<td>Z = 2.70*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condom Use (Wave III)</td>
<td>32.00</td>
<td>37.00</td>
<td>29.00</td>
<td>$\chi^2 =71.50^*$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive STI $^5$ Test (WIII)</td>
<td>7.04</td>
<td>5.10</td>
<td>7.10</td>
<td>$\chi^2 =17.06^*$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

$^*$Significant at the 0.001 level.

$^1$Standard Deviation; $^2$ Z test (differences between means) and Chi-square tests (differences between proportions) were employed to test gender differences. $^3$Stressful Life Events; $^4$Centers for Epidemiological Studies-Depression; $^5$Sexually Transmitted Infections
Bivariate Relationships among Study Variables

Table 8 presents weighted bivariate correlations among the main predictor variables and the dependent outcome variables investigated in the present study. Not surprisingly, stressful life events at Wave I and Wave II had the highest correlation with depressive symptoms (r = 0.20 and r = 0.25, respectively, both p < 0.001). Family social support was relatively more strongly correlated with depressive symptoms (r = -0.30 and -0.33 for Wave I and Wave II, respectively) and problem-focused coping skills (r = 0.2) than were any of the other variables.

Results indicated no significant relationship (p > 0.05) between adolescent depressive symptoms and condom use at last sexual intercourse. However, there was a weak but significant, positive correlation between depressive symptoms at Wave I and Wave II with number of partners (r = 0.03, r = 0.03, p < 0.001). Bivariate analysis also revealed that Wave I stressful life events was weakly related to a greater number of partners (r = 0.10, p < 0.00) and nonuse of condom at last sexual intercourse (r = 0.04, p < 0.05). The correlation between social support from family and number of sexual partners was low but statistically significant (r = 0.04, p < 0.00). A similar pattern was obtained for the relationship between social support from friends and number of sexual partners (r = -0.02, p < 0.00) and condom use at last sexual intercourse (r = -0.05, p < 0.00). Statistically significant associations were found between a positive STI test and all independent variables, except problem-focused coping skills (r = 0.00, p > 0.05) and social support from friends (r = 0.00, p > 0.05).
Table 9 provides bivariate relationships between these variables and demographic characteristics. Preliminary analyses involving demographic control variables were conducted to determine whether these variables were related to study variables and should, therefore, be controlled in testing relationships among the variables of interests. A significance criterion of 0.05 was used to decide whether a demographic variable was sufficiently confounded with a study variable that it needed to be added as a control variable in subsequent analyses.

The correlations among the independent variables are not large except for the correlations between the same indicators at Wave I and Wave II. In general, the correlations among independent variables were quite low and indicate the absence of multicollinearity. This lack of multicollinearity is important, because in SEM absence of multicollinearity among variables is an assumption and it is recommended to avoid variables with a bivariate correlation of greater than 0.7 (Raines, 2011, p.50).

For the purpose of measuring bivariate correlations between covariates and the main predictor variables, the categories for the parents’ highest education were collapsed into a dichotomous variable with 1 indicating some college degree or more and 0 indicating equivalents or less than a high school diploma. The family income variable was also dichotomized for the sake of simplicity, scoring it as 1 if the annual income was above $20,000 and 0 if otherwise (Volpe & Chen, 2002). The race/ethnicity variable was also converted into a dichotomous variable with the value of 1 if a person considered him or herself as White, and 0 if not White.
Table 8: Correlations Matrix for Major Study Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>SLE (W1)</th>
<th>SLE (WII)</th>
<th>CES (W1)</th>
<th>CES (WII)</th>
<th>Problem-focused Coping skills (WI)</th>
<th>Unhealthy coping (WII)</th>
<th>Family social support (WI)</th>
<th>Friends social support (WII)</th>
<th>Number of partners (WIII)</th>
<th>Condom nonuse (WIII)</th>
<th>Positive STI test (WIII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE (W1)</td>
<td>1.00</td>
<td>0.46*</td>
<td>0.22*</td>
<td>0.22*</td>
<td>-0.05*</td>
<td>0.17*</td>
<td>-0.18*</td>
<td>0.00</td>
<td>0.10*</td>
<td>0.04**</td>
<td>0.02**</td>
</tr>
<tr>
<td>SLE (WII)</td>
<td>0.46*</td>
<td>1.00</td>
<td>0.20*</td>
<td>0.25*</td>
<td>-0.05*</td>
<td>0.20*</td>
<td>-0.16*</td>
<td>0.00</td>
<td>0.11*</td>
<td>0.09*</td>
<td>0.03*</td>
</tr>
<tr>
<td>CES-D (W1)</td>
<td>0.26*</td>
<td>0.20*</td>
<td>1.00</td>
<td>0.60*</td>
<td>-0.13*</td>
<td>0.09*</td>
<td>-0.33*</td>
<td>0.13*</td>
<td>0.03*</td>
<td>0.01</td>
<td>0.04*</td>
</tr>
<tr>
<td>CES-D (WII)</td>
<td>0.22*</td>
<td>0.25*</td>
<td>0.60*</td>
<td>1.00</td>
<td>-0.07*</td>
<td>0.10*</td>
<td>-0.30*</td>
<td>0.10*</td>
<td>0.03*</td>
<td>0.00</td>
<td>0.05*</td>
</tr>
<tr>
<td>Problem-focused Coping skills (WI)</td>
<td>-0.05*</td>
<td>-0.04*</td>
<td>-0.13*</td>
<td>-0.07*</td>
<td>1.00</td>
<td>-0.07*</td>
<td>0.20*</td>
<td>0.03*</td>
<td>-0.01</td>
<td>0.03*</td>
<td>0.00</td>
</tr>
<tr>
<td>Unhealthy coping (WII)</td>
<td>0.17*</td>
<td>0.20*</td>
<td>0.09*</td>
<td>0.10*</td>
<td>-0.07*</td>
<td>1.00</td>
<td>-0.11</td>
<td>0.03*</td>
<td>0.11*</td>
<td>0.02*</td>
<td>0.02*</td>
</tr>
<tr>
<td>Family social support (WI)</td>
<td>-0.18*</td>
<td>-0.20*</td>
<td>-0.30*</td>
<td>-0.27*</td>
<td>0.20*</td>
<td>-0.10*</td>
<td>1.00</td>
<td>-0.05*</td>
<td>-0.04*</td>
<td>-0.01</td>
<td>-0.02*</td>
</tr>
<tr>
<td>Friends social support (WI)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.13*</td>
<td>0.10*</td>
<td>0.03*</td>
<td>0.03*</td>
<td>-0.05*</td>
<td>1.00</td>
<td>-0.02*</td>
<td>-0.05*</td>
<td>0.00</td>
</tr>
<tr>
<td>Number of partners (WIII)</td>
<td>0.10*</td>
<td>0.11*</td>
<td>0.03*</td>
<td>0.03*</td>
<td>-0.01</td>
<td>0.11*</td>
<td>-0.04*</td>
<td>-0.02*</td>
<td>1.00</td>
<td>0.17*</td>
<td>0.03*</td>
</tr>
<tr>
<td>Condom nonuse (WIII)</td>
<td>0.04</td>
<td>0.09*</td>
<td>-0.01</td>
<td>-0.00</td>
<td>0.03*</td>
<td>0.02*</td>
<td>-0.01</td>
<td>-0.05*</td>
<td>0.17*</td>
<td>1.00</td>
<td>0.04*</td>
</tr>
<tr>
<td>Positive STI test (WIII)</td>
<td>0.02**</td>
<td>0.03*</td>
<td>0.04*</td>
<td>0.05*</td>
<td>0.00</td>
<td>-0.02</td>
<td>-0.02</td>
<td>0.00</td>
<td>0.04*</td>
<td>0.04*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes:
*p < 0.001; **p < 0.05  
1 Stressful Life Events; 2 Centers for Epidemiological Studies-Depression; 3 Sexually Transmitted Infections
Table 9: Values of Spearman’s Rank Order between Demographic Control Variables, Predictors, and Outcomes

<table>
<thead>
<tr>
<th>Variables</th>
<th>SLE¹ (WI)</th>
<th>SLE (WII)</th>
<th>CES-D² (WI)</th>
<th>CES-D (WII)</th>
<th>Coping skills (WI)</th>
<th>Unhealthy coping (WII)</th>
<th>Family social support</th>
<th>Friends social support</th>
<th>Number of partners</th>
<th>Condom use</th>
<th>STI³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>-0.07*</td>
<td>-0.08*</td>
<td>0.10*</td>
<td>0.10*</td>
<td>-0.01</td>
<td>0.00</td>
<td>-0.01</td>
<td>0.36*</td>
<td>-0.04*</td>
<td>-0.07*</td>
<td>0.03**</td>
</tr>
<tr>
<td>Age</td>
<td>0.05*</td>
<td>0.03*</td>
<td>0.11*</td>
<td>0.12*</td>
<td>0.08*</td>
<td>0.11*</td>
<td>-0.15*</td>
<td>0.11</td>
<td>0.02</td>
<td>-0.05*</td>
<td>-0.01</td>
</tr>
<tr>
<td>White</td>
<td>-0.05*</td>
<td>-0.06*</td>
<td>-0.1*</td>
<td>-0.14*</td>
<td>-0.09*</td>
<td>0.06*</td>
<td>-0.03*</td>
<td>0.00</td>
<td>-0.03*</td>
<td>-0.08*</td>
<td>-0.18*</td>
</tr>
<tr>
<td>Family income &gt; $20,000</td>
<td>-0.07*</td>
<td>-0.09*</td>
<td>-0.11*</td>
<td>-0.12*</td>
<td>-0.06*</td>
<td>0.06*</td>
<td>0.04*</td>
<td>-0.00</td>
<td>-0.03*</td>
<td>-0.09**</td>
<td>-0.20*</td>
</tr>
<tr>
<td>Two-parent family structure</td>
<td>-0.13*</td>
<td>-0.12*</td>
<td>-0.13*</td>
<td>-0.12*</td>
<td>-0.00</td>
<td>-0.04*</td>
<td>0.16*</td>
<td>-0.02*</td>
<td>-0.05*</td>
<td>-0.02*</td>
<td>-0.09*</td>
</tr>
<tr>
<td>parent education, Greater than high school</td>
<td>-0.05*</td>
<td>-0.08*</td>
<td>-0.08*</td>
<td>-0.09*</td>
<td>-0.03*</td>
<td>0.01</td>
<td>0.00</td>
<td>0.03*</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Notes:
* p < 0.001; ** p < 0.01
¹ Stressful Life Events; ² Centers for Epidemiological Studies-Depression; ³ Sexually Transmitted Infections
Results for Specific Aim 1

Specific Aim 1: Examine the relationships between stressful life events, depressive symptoms and subsequent risky sexual behavior (frequency of sexual intercourse, inconsistent condom use and having multiple sexual partners) during adolescence and emerging adulthood.

The first aim of this dissertation was to test and describe relationships between depressive symptoms, stressful life events, and the latent construct of sexual risk behavior. Five models were tested, including 1) a measurement model of the latent outcome variable (sexual risk behavior), 2) reciprocal relationships between depressive symptoms and stressful life events in adolescence, 3-4) two proposed mediational models, and 5) a full model were analyzed. These models were estimated using the total sample, with separate analyses and estimations being specified for males and females (see Appendix A).

Confirmatory Factor Analyses

A confirmatory factor analysis (CFA) was conducted to determine if the model containing three factors labeled “frequency of sexual intercourse in the past year”, “condom use at last sexual intercourse”, and “number of sexual partners in the past year” fit the data. Preliminary analyses showed that one indicator (frequency of sexual intercourse) loaded poorly on the proposed latent variable. With regard to model fit, including this indicator yielded a very large value for chi-square (χ2= 1495.13, p = 0.001), while the CFI (0.65), TLI (- 0.04), and RMSEA (0.32) also indicated model misfit. Therefore, the variable frequency of sexual intercourse was omitted from
subsequent SEM analyses presented in Chapter VI. The poor loading could be due to the high dispersion of this behavior (SD = 93.79, \( \sigma^2 = 9796.56 \)), an extreme negative skewness in distribution, and extreme values of frequency of sexual intercourse reported by young adults (Nelson et al., 2010, p.30).

For the CFA and SEM presented here, condom use at last sexual intercourse and the number of sexual partners were combined to obtain the sexual risk behavior latent factor. Estimates indicated that the two indicators loaded significantly onto one latent factor of sexual risk behavior. This provides support for the adequacy of indicator variables used to represent the proposed latent factor (condom use at last sexual intercourse and the number of sexual partners). Fit indices indicated that the proposed model fits the data well; the latent construct was significantly related to its hypothesized indicators (\( \chi^2 = 15.30, \) df = 11, \( p = 0.16, \) CFI = 0.99, TLI = 0.99, RMSEA = 0.001) and all standardized factor loadings were above the recommended guideline of 0.40 (Stevens, 1992; Brown, 2006). These two factors explained approximately 25 percent of the variability in sexual risk behavior. Standardized parameter estimates and fit statistics from the model are available in Figure 12.
Hypothesis 1a: Depressive symptoms at Wave II will be predicted by stressful life events at Wave I independent of depressive symptoms at Wave I, while stressful life events at Wave II will be predicted by depressive symptoms at Wave I independent of stressful life events at Wave I.

To test this hypothesis, Mplus used the MLR estimator. Mplus, by default, uses the Maximum Likelihood (ML) estimator for SEM analyses when there is no categorical outcome (Muthén & Muthén, 1998-2015, p.435). Results indicated that this model converged and terminated normally. As indicated by the CFI and Tucker-Lewis Fit Index (TLI), the proposed model exhibited a good fit to the data ($\chi^2 = 1.48$, df = 1, p = 0.22, CFI=0.99, TLI=0.99, RMSEA=0.00).
CFI = 1; TLI = 0.99; RMSEA=0.01). In addition to path coefficients, Figure 13 provides correlations among depressive symptoms and stressful life events in adolescence; indicating significant bivariate associations between these variables at both Wave I and II. Of interest, Wave I depressive symptoms were associated with Wave II stressful life events, and vice versa. All pathways were statistically significant at p < 0.05 and in the predicted direction. Therefore, Hypothesis 1a purporting a bidirectional effect between depressive symptoms and stressful life events was supported.

Although results suggested that the proposed model had good fit with the observed variables, they did not indicate that all relationships between covariates and main predictor variables were statistically significant. However, non-significant relationships among covariates were not removed from the model, because these variables could influence the subsequent tests of mediation for Hypotheses 1b and 1c in the final model.

Appendix A presents analysis by gender. See Figures 13a and 13b for male and female path models testing this hypothesis. First, the model fit indices were compared across gender to assess which model provided a better fit to the data and then the significance of path coefficients in the structural models are discussed.
Figure 13: Coefficients from Analysis of Hypothesis 1a: Evaluating Bidirectional Relationships between Depressive Symptoms and Stressful Life Events (n = 18,825)

Hypothesis 1b: Stressful events at Wave II will mediate the relationship between depressive symptoms at Wave I and risky sexual behaviors at Wave III.

Adolescent depressive symptoms at Wave I were hypothesized to have an indirect effect of sexual risk behavior through stressful life events. In Mplus, the WLSMV was used to estimate individual parameter estimates because models contained categorical data. All paths were estimated after controlling for all control variables. The direct and indirect relationships between depressive symptoms and stressful life events were summarized in Figure 14. Results suggest this mediational model provided nearly adequate fit to the observed data ($\chi^2= 30, df = 15, p > 0.05$, $CFI=0.99$; $TLI = 0.99$; $RMSEA=0.00$), once other factors were controlled.
To investigate whether stressful life events experienced in adolescence helped to explain or mediate the relationship between reported depressive symptoms and sexual risk behavior in young adulthood, a path model was tested. Figure 14 presents details of the estimated specific mediation effects, together with their confidence intervals. Confidence intervals for the parameter estimates were calculated using the bootstrap resampling technique with 200 replicates (Shrout & Bolger, 2002). Results showed that most of the effects of depressive symptoms on risky sexual behavior outcomes in young adulthood were indirect. Depressive symptoms reported in Wave I did not have a direct effect ($\beta = -0.00$, 99% CI [-0.06 ± 0.95], $p = 0.5$) on sexual risk behavior reported at Wave III. The 99% confidence interval for the mediation effect of stressful life events did not contain zero, which indicated that the mediation effect was significantly different from zero ($\beta = 0.05$, 99% CI [0.02 - 0.06], $p = 0.00$). Although small ($\beta = 0.05$, SE = 0.01), the coefficient for the indirect effect nevertheless reflects a statistically significant correlation ($p < 0.001$). These findings were supportive of Hypothesis 1b in which adolescent reports of depressive symptoms at Wave I had an indirect positive effect on young adulthood sexual risk behavior through experiences of stressful life events at Wave II. The model explained about 30 percent of the variance in sexual risk behavior. Separate models testing this hypothesis for males and females can be found on Appendix B (see Table 10).
Figure 14: Coefficients from Analysis of Hypothesis 1b: Effects from Adolescent Depressive Symptoms on Sexual risk behavior in Young Adulthood (n = 18,825)

Hypothesis 1c: Depressive symptoms at Wave II will mediate the relationship between stressful life events at Wave I and risky sexual behaviors at Wave III.

For Hypothesis 1c, it was expected the relationships between youths’ stressful life events at Wave I and their sexual risk behavior in young adulthood were mediated by their reports of depressive symptoms at Wave II. This model is displayed in the Figure 15. The results of fit statistics for this model indicated a significant $\chi^2 (\chi^2 = 74.17, \text{df} = 33, p = 0.00)$, while the CFI of 0.97, TLI of 0.95, and RMSEA of 0.008 all indicated good model fit. The findings, nevertheless, did not support the hypothesized mediational model (Hypothesis 1c). Adolescent stressful life events at Wave I had a direct effect on
sexual risk behavior in young adulthood ($\beta = 0.14, 99\% \text{ CI} [0.09-0.18], p < 0.00$) but not an indirect effect ($\beta = -0.00, 99\% \text{ CI} [-0.01-0.00], p = 0.12$) through reported depressive symptoms at Wave II on sexual risk behavior. The 95\% confidence interval for the mediation effect contains zero; thus, the mediation effect from depressive symptoms to sexual risk behavior was not significantly different from zero. The model was also found to explain 30 percent of the variance. Details for separate tests of this hypothesis for males and females can be found in Appendix B (see Table 11).

**Figure 15: Coefficients from Analysis of Hypothesis 1c: Effects from Adolescent Stressful Life Events to Sexual Risk Behavior in Young Adulthood (n = 18,920)**

![Path diagram](image)

- $\chi^2 = 74.17; df = 33; p = 0.00$
- CFI=0.97
- TLI=0.95
- RMSEA=0.008
- $^*p < 0.001.$

**Notes:**
- CFI=comparative fit index.
- TLI=Tucker-Lewis index.
- RMSEA=root mean square error of approximation.
- Effects from stressful life events WI (99\% confidence interval):
  - Direct effect: $\beta = 0.14 (0.09 - 0.18)^*$
  - Indirect effect: $\beta = 0.00 (0.01 - 0.005)$
  - Total: $\beta = 0.13 (0.08 - 0.18)^*$
  - Total indirect: $\beta = -0.00 (-0.02 - 0.00)$
- Paths from baseline covariates are not shown.
Full Aim 1 Model: Mental Health Pathway Model

Model specification for this full model is depicted in Figure 16. Revision of this model from the original hypothesis included removing one non-significant path (between depressive symptoms at Wave II and sexual risk behavior in young adulthood). The path between depressive symptoms at Wave I and sexual risk behavior was also nonsignificant but was not removed in order to examine the mediator effect in the final model.

Results indicated a significant $\chi^2$ ($\chi^2 = 311; \text{df} = 30$); however, other fit indices indicated a good fit; the CFI of 0.95, TLI of 0.95, and RMSEA of 0.02. Modification indices (MIs) are post hoc statistics that Mplus provides to improve model fit. The MIs suggested three paths that could be added, although adding two of these paths were not recommended, as this would compromise the theoretical foundation of the proposed model (e.g., a path from the number of sexual partners to stressful life events). The MIs also recommended adding estimates of the error terms for the observed variables; that is, the number of sexual partners to condom use at last sexual intercourse and also the path from depressive symptoms to stressful life events at Wave II. However, only the path between depressive symptoms and stressful life events was added because it could be justified on theoretical grounds. This addition did improve fit ($\chi^2 = 105, \text{df} = 27, p < 0.00$, CFI= 0.98; TLI = 0.96; RMSEA=0.01), but still not all indices met criteria for a good fit (see Figure 16). The $\chi^2$ test was again significant, perhaps due to the large sample size ($n = 18,825$) (Bentler, 1990).

Despite the inclusion of covariates (and somewhat worse model fit), the same direct and mediated relationships between adolescent depressive symptoms, experiences
of stressful life events, and sexual risk behavior in young adulthood continued to be observed (see Figure 16). Results indicated that higher levels of stressful life events at Wave I and Wave II were significantly related to higher sexual risk behavior at Wave III ($\beta = 0.06$ and $0.20$, respectively). Only one nonsignificant path existed in this model, that from depressive symptoms at Wave I to sexual risk behavior ($\beta = -0.02$, SE = 0.02). The confidence interval for the indirect effect of depressive symptoms on sexual risk behavior did not contain 0 (99% CI [0.01 – 0.03]), indicating that the indirect effect through stressful life events was significant. The R-squared value for the model in Figure 16 was 25 percent. Taken together these results suggest that the hypothesized models provided adequate descriptions of the relationships among this set of predictors during adolescence and sexual risk behavior in young adulthood. Results for the full Aim 1 structural equation models for males and females are provided in Appendix B (see Figures 16a and 16b).
Figure 16: Standardized Path Coefficients for Full Aim Model 1 (n = 18,825)

Results for Specific Aim 2

*Specific Aim 2: Examine relationships between depressive symptoms at Wave I, unhealthy coping strategies and stressful life events at Wave II, and risky sexual behavior at Wave III.*

The second aim sought to examine the relationships between adolescents’ unhealthy coping skills at Wave II, their depressive symptoms at Wave I, and reports of stressful life events at Wave II. Multiple steps were taken in order to determine these relationships. Three models were estimated: 1) relationships between depressive symptoms unhealthy coping and sexual risk behavior, 2) one proposed mediational models, and 3) a full Aim 2 model. Covariates were added to the models in order to
evaluate the role of unhealthy coping in relationship between depressive symptoms at Wave I, stressful life events at Wave II and sexual risk behavior at Wave III, after controlling for gender, age, family structure, family annual income, and ethnicity/race.

**Hypothesis 2a:** Higher stressful life events at Wave II will be associated with unhealthy coping strategies at Wave II, which in turn is associated with higher levels of risky sexual behaviors at Wave III.

Figure 14 provides standardized path coefficients and illustrates relationships among variables for the test of Hypothesis 2a. Specifically, unhealthy adolescent coping at Wave II was positively associated with their sexual risk behavior at Wave III ($\beta = 0.20$, SE = 0.06). Unhealthy coping at Wave II was also positively associated with greater reports of stressful life events at Wave II ($\beta = 0.21$, SE = 0.00), after controlling the effects of covariates. Fit indices suggested adequate fit ($\chi^2 = 23.20$, df = 14, $p<0.07$, CFI= 0.99; TLI = 0.99; RMSEA=0.007). Results showed that only one insignificant path existed in this model, that from stressful life events at Wave II to sexual risk behavior at Wave III ($\beta = 0.17$, SE = 0.08). An expected finding was the positive significant path ($\beta = 0.20$, SE = 0.06) from unhealthy coping at Wave II to sexual risk behavior at Wave III, namely higher unhealthy coping led to higher sexual risk behavior. Thus, the results supported Hypothesis 2a. This model explained a significant 14 percent of the variance sexual risk behavior. Separate results for males and females for this hypothesis can be found in Appendix B (See Figures 17a and 17b).
**Figure 17:** Coefficients from Analysis of Hypothesis 2a: Evaluating Relationships between Stressful Life Events, Unhealthy Coping, and Sexual Risk Behavior (n = 18,276)

Hypothesis 2b: Unhealthy coping strategies at Wave II will mediate the relationship between depressive symptoms at Wave I and sexual risk at Wave III (Indirect effect).

Figure 18 details the model, standardized path coefficients, and the estimated specific mediation effects, together with their bootstrapped confidence interval for examining the effects of depressive symptoms at Wave I on unhealthy coping at Wave II and sexual risk behavior at Wave III after controlling for covariates. Fit indices suggested adequate model fit: $\chi^2= 23.20$, df = 14, $p = 0.06$, CFI= 0.99; TLI = 0.99; RMSEA=0.007. The chi-square statistic was not significant, indicating adequate fit of this model. The path coefficient from adolescent depressive symptoms to sexual risk behavior in young
adults ($\beta = 0.05, \text{SE} = 0.02$) was positive but not statistically significant ($p > 0.05$). In the figure notes, standardized coefficients indicated that depressive symptoms did not have a direct effect on sexual risk behavior ($\beta = 0.03, 99\% \text{ CI} [-0.04-0.08], p = 0.30$), but it had an indirect effect on sexual risk behavior through unhealthy coping ($\beta = 0.02, 99\% \text{ CI} [0.006-0.03], p < 0.00$). The bootstrapped confidence interval did not contain zero, so there is evidence that there is a small but meaningful mediation effect. Therefore, Hypothesis 2b was supported. However, the results should be interpreted with caution because the positive indirect effect of adolescent depressive symptoms at Wave I on sexual risk behavior in young adulthood was quite weak ($\beta = 0.02, \text{SE} = 0.00$). The model predicted 17 percent of the variance in the dependent variable. Separate details for males and females can be found in Appendix B (see Table 12).
Figure 18: Coefficients from Analysis of Hypothesis 2b: Effects from Adolescent Depressive Symptoms to Sexual Risk Behavior in Young Adulthood (n = 18,825)

Notes: The extra information is for test of mediation effects.

**Full Aim 2 Model: Unhealthy Coping Pathway Model**

The full Aim 2 model was tested based on the path models previously validated in Hypotheses 2a and 2b. The fit indices for this full model were $\chi^2 = 36.52$, df = 25, $p<0.06$, CFI= 0.98; TLI = 0.97, RMSEA=0.008. The fit indices demonstrated good fit of the model to the data. Figure 19 presents the schematic presentation of the full model with standardized regression coefficients with corresponding significance levels. All paths were significant except two; one from depressive symptoms at Wave I to sexual risk behavior at Wave III, and the other from stressful life events at Wave II to sexual risk behavior at Wave III. As for unhealthy coping, the data indicated that higher depressive
symptoms ($\beta = 0.05$, SE = 0.01) and stressful life events ($\beta = 0.17$, SE = 0.00) related positively and significantly to unhealthy coping. An interesting finding was that the only significant path to sexual risk behavior in young adulthood was from unhealthy coping in adolescence ($\beta = 0.16$, SE = 0.02). The coefficient for the indirect effect of depressive symptoms at Wave I sexual risk behavior at Wave III through unhealthy coping at Wave II was small in magnitude but significant ($p < 0.001$). Therefore, perhaps other potential mediators would be important to include in the model in addition to unhealthy coping.

The mediation model for Hypothesis 2 showed that the total indirect effect for unhealthy coping mediating the relationship between depressive symptoms and sexual risk behavior was non-significant (CI [-0.005-0.02], $p > 0.05$). However, a significant total effect is not a requirement for measuring a specific indirect effect (Preacher & Hayes, 2008, p.882). Under these conditions, Preachers & Hayes (2008) suggested that researchers should focus more on the direct and specific indirect effects instead of focusing on the total indirect effect. Overall, the model explained 15 percent of the variance. Details of models for males and females are provided in the Appendix B (see Figures 19a and 19b).
Results for Specific Aim 3

Specific Aim 3: Examine the relationships between perceived social support (Wave I), problem-focused coping skills (Wave I), stressful life events (Wave II), depressive symptoms (Wave II), risky sexual behaviors (Wave III), and STIs during adolescence and emerging adulthood.

The third specific aim for this dissertation was to examine theoretical relationships between adolescent problem-focused coping skills at Wave I, social support at Wave I, depressive symptoms at Wave II, stressful life events at Wave II, and sexual risk behavior at Wave III. Four main hypotheses were tested. The Full Aim 3 Model
included all paths in order to evaluate the following: 1) whether problem-focused coping skills have an inverse direct effect on stressful life events, which in turn over time leads to a decrease in sexual risk behavior and STIs, 2) whether problem-focused coping skills have an inverse direct effect on depressive symptoms, which in turn over time leads to a decrease in sexual risk behavior and STIs, 3) whether social supports from family/friends have an inverse direct effect on stressful life events, which in turn leads to a decrease in sexual risk behavior and STIs, and 4) whether social support from family/friends have an inverse direct effect on depressive symptoms, which in turn leads to a decrease in sexual risk behavior in young adulthood. Covariates were added to the models in order to evaluate hypothesized paths, after controlling for gender, age, family structure, family annual income, and ethnicity/race.

Model 3 added positive STI as one additional outcome. Positive STIs were not included in previous models because a largely equivalent measure (i.e., latent construct of sexual risk behavior) had already been incorporated in the development of the models. The inclusion of STIs as a new variable in Model 3 was also an attempt to introduce another indicator of sexual-risk taking that was not solely dependent upon self-reported behaviors. In this study, the direct effects of adolescence stressful life events and depressive symptoms on positive STI during young adulthood were investigated, but the primary focus remained on sexual risk behavior as the main outcome variable.

Hypothesis 3a: Higher levels of effective coping at Wave I will be associated with fewer stressful events at Wave II, which in turn leads to less risky sexual behaviors.

Stressful life events were hypothesized to have direct positive effects on STI at Wave III.
The estimated parameters for Hypothesis 3a are presented in Figure 20. The overall chi square was not significant, indicating a good fit. Also, other indices in Figure 26, such as CFI, TLI, and RMSEA suggested that the model fitted the data well ($\chi^2=37.33$, df = 24, p = 0.14, CFI= 0.99; TLI = 0.98; RMSEA=0.005). Findings indicated that three paths from adolescent coping skills and experiences of stressful life events to sexual risk behavior in young adulthood were significant. No direct effects from problem-focused coping skills on sexual risk behavior and STIs were anticipated because problem-focused coping was not expected to exert an influence in the absence of stressful life events. The path coefficient from the problem-focused coping skills to stressful life events was positive and statistically significant ($\beta = -0.05$, SE = 0.01), which was then positively associated with higher levels of sexual risk behavior ($\beta = 0.27$, SE = 0.02), but not with STIs ($\beta = 0.01$, SE = 0.03), after controlling for all other variables. Adolescent coping had a negative significant indirect effect on emerging adulthood sexual risk behavior ($\beta = -0.01$), although with very small magnitude. The range of confidence interval does not include zero meaning that there is likely to be a true indirect effect. Although, Hypothesis 3a was partially supported by the data, the indirect effect is fairly small. This model explained 12 percent of the variance. For details on models for males and females, see Appendix B (see Figures 20a and 20b).
Figure 20: Coefficients from Analysis of Hypothesis 3a: Evaluating Relationships between Stressful Life Events, Problem-focused Coping, and Sexual Risk Behavior (n = 18,641)

Hypothesis 3b: Higher problem-focused coping at Wave I will be associated with less depressive symptoms at Wave II, which in turn leads to less risky sexual behaviors (indirect effect). Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

Figure 21 presents the path model and goodness-of-fit indices for Hypothesis 3b. This model had a significant chi-square value ($\chi^2 = 66.28$, df = 18, p = 0.00). The CFI was 0.97, TLI was 0.95, and RMSEA was 0.01. Problem-focused coping skills at Wave I had a direct negative association with depressive symptoms at Wave II ($\beta = -0.09$, SE = 0.01). Figure 21 also shows that most paths were insignificant. For instance, the indirect path from problem-focused coping skills to sexual risk behavior through depressive
symptoms was not significant ($\beta = 0.00$, SE = 0.01). No attempt was made to improve this model because the MI suggestions were not analytically reasonable. For example, the MI suggested that the error terms of a covariate (race/ethnicity) and an independent variable (depressive symptoms) could be correlated. However, this suggestion violates analytical and theoretical rationale. As a result of the calculation of such correlations, the fit of the model to the data may improve, but it does not provide a better understanding of the phenomenon of interest or the hypothesis.

Overall, this proposed model was not deemed to be a good fit for the data; Hypothesis 3b was not supported by the data. Thus, this theoretical model should be further investigated and applied with caution. The total explained variance was around 12 percent for this model. See Appendix B for details of the male and female models (see Figure 21a and 21b).
Hypothesis 3c: Higher levels of perceived social support from family and friends at Wave I will be associated with fewer stressful events at Wave II, less risky sexual behavior (indirect effect). Stressful life events were hypothesized to have direct positive effects on STI at Wave III.

Family and friends social support are discussed separately, with the understanding that these resources may have different effects on the outcomes. Results regarding the effects of social support from family on sexual risk behavior are presented first, followed by the result for the friends’ social support variable.

Family Support: The fit statistics for this first model testing Hypothesis 3c suggested a good fit to the data (see Figure 22), including a chi-square value of 23.14.
with 18 degrees of freedom, which was not statistically significant (p = 0.18). The CFI for the hypothesized model was 0.99; the TLI was also 0.99; and RMSEA was 0.004. Social support from family from Wave I was negatively related to stressful life events at Wave II (β = -0.13, SE = 0.01), the more family support, the less stressful life events reported. Stressful life events were positively associated with sexual risk behavior (β = 0.19, SE = 0.02) and positive test results for STIs (β = 0.06, SE = 0.10) in young adulthood, even after controlling for other potentially confounding variables. The direct effect of stressful life events was increased when family social support was introduced into the model instead of problem-focused skills. An indirect, negative effect of family support through stressful life events on sexual risk behavior was small but significant (β = -0.04, SE = 0.00). Overall, the results suggested good data model fit. As such, the model suggested that the variables are associated in the context of the model and can be used to explain sexual risk behavior.

These findings support Hypothesis 3c. This model, which included social support from family, was more effective at explaining the dependent variable, compared to the models 3a and 3b. The total variance explained increased from 12 percent in models 3a and 3b to 22 percent in model 3c. For details of the models for males and females, see Appendix B (Figure 22a and 22b).
Figure 22: Coefficients from Analysis of Hypothesis 3c: Evaluating Relationships between Stressful Life Events, Family Social Support, and Sexual Risk Behavior (n = 18,641)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family social support I</td>
<td>-0.13*</td>
<td></td>
</tr>
<tr>
<td>Stressful events II</td>
<td>-0.13*</td>
<td></td>
</tr>
<tr>
<td>STI III</td>
<td>0.09*</td>
<td></td>
</tr>
<tr>
<td>Condom use III</td>
<td>0.47*</td>
<td></td>
</tr>
<tr>
<td>Sexual risk behavior</td>
<td>0.19*</td>
<td></td>
</tr>
<tr>
<td>Number of partners III</td>
<td>0.53*</td>
<td></td>
</tr>
</tbody>
</table>

Friends Support: Although the CFI (0.97), TLI (0.91), and RMSEA (0.01) for this model suggested good fit, the chi-square ($\chi^2 = 55.52, p < 0.00$) indicated poor model fit. Modification indices were examined for suggestions to improve model fit. None made theoretical sense (e.g., the addition of particular paths or a latent construct involving covariates). Because direct effects of social support from friends on sexual risk behavior and STI were not a focus of this hypothesis, in order to increase the model fit, non-significant direct paths (the weakest paths) were deleted as suggested by MacCallum (1986). Deleting non-significant paths from friends' social support to the outcomes resulted in slightly improved fit statistics on most indices: $\chi^2 = 48.94, p = 0.001$; CFI = 0.97; TLI = 0.94; RMSEA = 0.01). The final trimmed model (with nonsignificant paths...
deleted) is presented in Figure 23. It is important to note that, unexpectedly, social support from friends was positively associated with stressful life events, which suggested that adolescents reporting higher levels of friends’ social support were more likely to report more stressful life events (β = 0.06, SE = 0.01). The path from stressful life events to STIs was also not significant (β = 0.00, SE = 0.2). However, as hypothesized, stressful life events had significant direct effects on sexual risk behavior (β = 0.27, SE = 0.01). In sum, these results did not provide enough evidence to support Hypothesis 3c with regard to social support from friends. The model variables accounted for 11 percent of the variance. The result was a decrease in the variance explained for sexual risk behavior when social support from friends was added into the model. See Appendix B for details on the male and female models (Figures 23a and 23b).

**Figure 23: Coefficients from Analysis of Hypothesis 3c: Evaluating Relationships between Stressful Life Events, Friends Social Support, and Sexual Risk Behavior (n = 18,913)**

\[ \chi^2 = 48.94; df = 11; P = 0.00 \]
\[ CFI = 0.97 \]
\[ TLI = 0.94 \]
\[ RMSEA = 0.01 \]
* *p < 0.001.*

Notes:
- CFI=comparative fit index.
- TLI=Tucker-Lewis index.
- RMSEA=root mean square error of approximation.
- Indirect effect: β = 0.01 (0.004 - 0.01)*
- Total: β = 0.01 (-0.03 - 0.07)
- Total indirect: β = 0.01 (-0.05 - 0.07)
**Hypothesis 3d:** Higher levels of perceived social support from family and friends at Wave I will be associated with fewer depressive symptoms at Wave II, less risky sexual behaviors (indirect effect). Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

To address the research Hypothesis 3d, two models were tested: family support and friends’ support models. The results for the family social support model are presented first, followed by the results of the model for friends’ social support.

**Family Support:** This first model for Hypothesis 3d tested relations between depressive symptoms, support from family, sexual risk behavior, and STI. Results from Figure 24 indicated that this hypothesized model fit the data: $\chi^2 = 31.40, p = 0.14; \text{CFI} = 0.99; \text{TLI} = 0.99; \text{RMSEA} = 0.004$. Social support from family was directly and negatively related to depressive symptoms ($\beta = -0.22, SE = 0.01$). The pathway from depressive symptoms to sexual risk behavior was nonsignificant ($\beta = 0.19, SE = 0.23$), indicating no relationship. However, the pathway from adolescent depressive symptoms to STI in young adulthood was significant, indicating that a young person’s depressive symptoms have a significant impact on their risk for contracting STI ($\beta = 0.08, SE = 0.14$). Adolescence depressive symptoms and exposure to stressful life events were direct predictors of STI in young adulthood in Model 3c and Model 3d, those involving social support from family in the models. Mathematically, model 3a (see Figure 20) and model 3c (see Figure 22) share the same direct and indirect effects estimates, except for inclusion of problem-focused coping in model 3a versus social support from family in models 3c. Models 3a explained 12 percent of the variance, and the path from stressful
life events to STI did not obtain significance. The model 3c explained 22 percent of the variance, indicating an increase over inclusion of the social support from family. The models 3c and 3d predicted STI in young adults; however, these findings should not be overstated because there was only a negligible increase in the coefficient. Social support from family did not have a significant indirect effect on the relationship between depressive symptoms and sexual risk behavior ($\beta = 0.04, SE = 0.04, CI [-0.09 – 0.17]$). The R-squared value for the model equaled 20 percent. See Appendix B for details about male and female models (Figures 24a and 24b).

**Figure 24: Coefficients from Analysis of Hypothesis 3d: Evaluating Relationships between Depressive Symptoms, Family Social Support, Sexual Risk Behavior, and STI (n = 18,910)**

**Friends’ Support:** This second model testing hypothesized relationships, shown in Figure 43, exhibited bad fit according to most fit statistics ($\chi^2 = 200.39, P = 0.00, CFI = 0.91, TLI = 0.79, RMSEA = 0.02$). Although the CFI and RMSEA were acceptable at
0.91 and 0.02 respectively, the TLI was below the 0.90 threshold at 0.79 and the chi square was significant ($P = 0.00$) (see Figure 25).

**Figure 25: Coefficients from Analysis of Hypothesis 3d: Evaluating Relationships between Depressive Symptoms, Friend Social Support, Sexual Risk Behavior, and STI (n = 18,877)**

![Diagram showing relationships between variables](image)

\[ \chi^2 = 200.39, df = 19; P < 0.00 \]
\[ CFI = 0.91 \]
\[ TLI = 0.79 \]
\[ RMSEA = 0.02 \]
\[ *p < 0.001. \]

Notes:
- CFI = comparative fit index.
- TLI = Tucker-Lewis index.
- RMSEA = root mean square error of approximation.
- Effects from social support (95% confidence interval):
  - Direct effect: $\beta = 0.01 (0.01 - 0.03)$
  - Indirect effect: $\beta = 0.00 (0.00 - 0.00)$
  - Total: $\beta = 0.01 (0.01 - 0.01)$
  - Total indirect: $\beta = 0.00 (0.00 - 0.00)$

Model modification indices were examined to see whether adding or removing one or more paths might lead to better fit. The strongest modification index suggested that deleting a non-significant path from friends support to STI would lower the $\chi^2$ statistic by 17.06 points, thereby improving model fit. As shown in Figure 26, fit indices suggest that the modification resulted in an improved fit relative to the previous versions of this model but still did not fit the data well. The direct path from friends’ support to depressive symptoms was statistically significant ($\beta = 0.14, SE = 0.01$); however, the relationship between the variables was a positive one. This finding was unexpected and it
indicates that adolescents with higher levels of social support from friends reported higher overall scores of depressive symptoms. Social support from friends did not have significant indirect effect on the relationship between depressive symptoms and sexual risk behavior ($\beta = 0.00$, SE = 0.02, CI [-0.03 – 0.00]). Depressive symptoms measured at Wave II were not directly related to subsequent sexual risk behavior ($\beta = 0.00$, SE = 0.1) or STI ($\beta = 0.05$, SE = 0.08) in young adult. In summary, this analysis did not confirm Hypothesis 3D with regard to the impact of friends’ social support. For this model, the R-squared was 17 percent. See Appendix B for details about male and female models (Figures 26a and 26b).

**Figure 26: Coefficients from Analysis of Hypothesis 3d: Evaluating Relationships between Depressive Symptoms, Friend Social Support, Sexual Risk Behavior, and STI (n = 18,877).**

![Diagram](image-url)
Full Aim 3 Model: Social Support Pathway Model

To trim the full Aim 3 path model, one indicator (social support from friends) was deleted based on results from previous models. The hypothesized structural path model shown in Figure 41 fit the data well, $\chi^2 = 19.84, p = 0.34$, CFI = 0.99, TLI = 0.99, RMSEA = 0.002. Figure 27 also presents the standardized coefficients revealing a number of the structural paths in the model to be significant. All paths were statistically significant at $p < 0.05$ and in the predicted direction, except two paths from adolescent depressive symptoms to sexual risk behavior and STIs in young adulthood. Depressive symptoms did not have a direct effect on sexual risk behavior ($\beta = 0.09, SE = 0.45$) and not on STIs ($\beta = 0.02, SE = 0.14$). As predicted, problem-focused coping strategies at Wave I showed a direct negative association with stressful life events when ($\beta = -0.08; SE = 0.01$) and depressive symptoms when ($\beta = -0.06; SE = 0.01$). Experiences of stressful life events when were directly related to increased sexual risk behavior when ($\beta = 0.21; SE = 0.39$) and STIs ($\beta = 0.08; SE = 0.02$). In this final SEM model, the indirect pathway from coping via stressful life events remained significant even when covariates were entered into the model ($\beta = -0.003, SE = 0.01, CI [-0.004 to -0.001], p < 0.00$) (results not shown in the Figure 27). There also remained an indirect effect from social support from families to sexual risk behavior via stressful life events which approached significance ($\beta = -0.04, SE = 0.00, CI [-0.04 to -0.02], p < 0.00$) (data not shown).

Despite some weaknesses of the Full Aim 3 Model (e.g., insignificant path from depressive symptoms to STI), this model was the best model among all 3 models that were examined. This model, which represents a simultaneous effect of social support from family and problem-focused coping skills, showed a very good fit with the data and
significant path coefficients in most of the expected directions, and a sound theoretical adaptability to the study’s theoretical framework. However, none of this meant that the full model 3 is the best possible appropriate model. A major weakness of model 3, as shown in the Figure 27, was weak to moderate relationships within the model. This should be noted especially in light of the weak indirect effects of problem-focused skills and social support from family on sexual risk behavior. The model 3 explained 23 percent of the total variance. See Appendix B for information on male and female models (see Figures 27a and 27b).

**Figure 27: Standardized Path Coefficients for Model 3: Relationships between Stressful Life Events, Depressive Symptoms, Coping Skills, Family Social Support, Sexual Risk Behavior, and STI (n = 18,641)**

![Diagram of standardized path coefficients for Model 3](image)

$\chi^2=19.84; \text{df}=18; \rho=0.34$

CFI=0.99

TLI=0.99

RMSEA=0.002

$p < 0.001$

Notes:

CFI=comparative fit index.

TLI= Tucker-Lewis index.

RMSEA=root mean square error of approximation.
CHAPTER V: DISCUSSION AND CONCLUSION

This chapter summarizes the findings from this dissertation, discusses its limitations, provides implications for practice, as well as directions for future research. The chapter includes the following sections: 1) general considerations when interpreting results, 2) bidirectional relationships between stressful life events and depressive symptoms, 3) effects of adolescence stressful life events and depressive symptoms on sexual risk behavior among young adults, 4) effects of adolescent problem-focused coping on mental health and on young adult sexual risk behavior, and 5) effects of adolescent social support from family and friends on mental health and on young adult sexual risk behavior. The limitations of this research study and the implications for practice are then presented, followed by directions for future research.

General Considerations

The conclusions that can be drawn from the findings are meaningful from a statistical point of view, given the large number of participants in the Add Health dataset. However, the findings of the present study should be interpreted cautiously for one main reason: significance of correlation and path coefficients were influenced by the sample size. Therefore, when interpreting results, it is important to take the high statistical power of this research study into consideration. For example, this study reported significant (p < 0.001) coefficients equal to 0.01, which is a very negligible size in terms of magnitude. This was achieved with the large sample size of over 18,000 participants, which meant that even small effects were significant. It is noteworthy that with a large sample size as Add Health, the likelihood that an extremely weak association will achieve statistical
significance is high. So while the small effect size attained was statistically significant, the amount of difference from zero was barely noticeable and does not imply practical importance.

Although there is no firm rule, there are some general recommendations for dealing with this problem that can be useful. One suggestion is to interpret the correlation coefficient descriptively; that is, as a weak, moderate, or strong correlation in itself (Leech, Barrett, & Morgan, 2014, p.98). When drawing conclusions about the practical importance of an effect that was observed, one should pay close attention to both the magnitude and the precision of the estimated effect. A second suggestion is to examine the confidence interval of a parameter to determine whether the result has practical importance or not (Utts & Heckard, 2011, p.663). In line with these recommendations (Utts & Hechard, 2011), the findings were reported in tables and figures in Chapter VI in order to make sure that key values (i.e., confidence interval for the magnitude of effects, bootstrapped effects, and p values) were presented.

**Hypothesis 1a: Relationships between Stressful Life Events and Depressive Symptoms**

The following hypothesis was proposed to investigate the bidirectional relationship between stressful life events and depressive symptoms: *Depressive symptoms at Wave II will be predicted by stressful life events at Wave I independent of depressive symptoms at Wave I, while stressful life events at Wave II will be predicted by depressive symptoms at Wave I independent of stressful life events at Wave I.*
The results of the current study support the notion that the nature of the relationships between stressful life events and depressive symptoms is bidirectional. This is consistent with Hammen’s (1991) stress generation theory, namely that depressed individuals tend to generate more stressors in their own lives due to their comorbid behavior problems, which in turn, may lead to continued depression, and so forth. Both cross-sectional and longitudinal studies have supported the reciprocal relations among these variables in adolescent community samples (Hankin et al., 2004), women (Hammen, 1992; Pianta & Egeland, 1994), children (Shih, Abela, & Starrs, 2009), and adults (Daley et al., 1998). For example, in a three-wave, 1-year longitudinal study of adolescent mothers (8th and 10th graders), Hankin et al. (2004) examined the stress-generation hypothesis using structural equation modeling to control for continuity of depression and stressors over time. Results indicated that depressive symptoms at one time point contributed to the subsequent increases in stressors at the following time point and those stressors at the same time point were simultaneously associated with increases in depressive symptoms. Similar results were obtained in a 1-year longitudinal study of mothers (aged 12-37) of affectively disordered parents (Pianta and Egeland, 1994). Pianta and Egeland (1994) found a bidirectional relationship between the occurrence of negative events and increases in depressive symptoms. The findings indicate that depressive symptomatology was predictive of interpersonal problems measured with the Stressful Life Events scale (e.g., unemployment and family violence). Cole et al. (2006) in a 6-Wave 6-month longitudinal study of 708 adolescents (grades 7-9) also found that self-reported stressful life events were found to significantly contribute to the onset of
depressive symptoms; the reciprocal relation between stressful life events and depression was also supported in this study.

Despite widespread acceptance of a connection between stressful life events and depression, many questions on the mechanisms through which stress generation operates remain unanswered. Much of the past literature has focused on testing stressful life events and depressive symptoms as predictor and outcomes across multiple time points (Pianta & Egelnan, 1994; Daley et al., 1998; Shih, Abela, & Starrs, 2009), while the essential characteristics that drive this phenomenon remain unclear. For example, research suggests that an interaction between specific types of vulnerabilities (e.g., genetic predisposition, personality), protective resources (e.g., social support, adequate coping skills) and stressors may lead to the expression of depression. In fact, only 20% of people exposed to stressful life events will develop depressive disorders (Gotlib & Hammen, p.299). Hammen et al., (1986), in a longitudinal study, found that non-symptomatic people were relatively resistant to becoming depressed even when exposed to stressful life events, while individuals with depressive symptoms tended to experience both continuing depression and more negative life events over time. A multitude of risk factors contribute to the onset of depression, and it is the combination of these factors that place one at risk for developing depressive disorders. Incorporating these factors into stress generation research may help to explain why some develop depression after exposure to stressful life events, whereas others do not. Findings of the present study with regard to the possible bidirectional relationships between stressful life events and depressive symptoms are limited to a sample of adolescents who participated in Wave I and Wave II
of the Add Health study. Therefore, future research is also needed to replicate findings from the current study among emerging adults.

Effects of Stressful Life Events and Depressive Symptoms on Sexual Risk Behavior

The following two hypotheses were proposed for investigating the mediation roles of stressful life events and depressive symptoms and their effects on the outcome of sexual risk behavior.

**Hypothesis 1b:** Stressful events at Wave II will mediate the relationship between depressive symptoms at Wave I and risky sexual behaviors at Wave III.

**Hypothesis 1c:** Depressive symptoms at Wave II will mediate the relationship between stressful life events at Wave I and risky sexual behaviors at Wave III.

The study extends the literature by examining the effects of both depressive symptoms and stressful life events in adolescence on emerging adults’ sexual risk behavior. In terms of the specific indirect paths, there was support for Hypothesis 1b that stressful life events during adolescence would mediate the relation between adolescent depressive symptoms at Wave I and young adult sexual risk behavior. However, support for Hypothesis 1c was not found. That is, depressive symptoms during adolescence did not mediate the relation between stressful life events at Wave I and sexual risk behavior during young adulthood, while adjusting for covariates. More specifically, depressive symptoms were related to greater levels of stressful life events, which in turn were related to sexual risk behavior.
Although adolescent depressive symptoms were not directly associated with sexual risk behavior during emerging adulthood, these findings indicate that, in a nationally representative sample of adolescents, depressive symptoms were associated with sexual risk behavior through their effect on stressful life events. As shown in Figure 14, stressful life events were directly associated with sexual risk behavior, while in the mediation model (Figure 15), stressful life events did not have an indirect effect on sexual risk behavior. Thus, we might conclude that depressive symptoms may be a more distal or indirect factor of sexual risk behavior in the study’s sample while stressful life events is a proximal or direct factor of sexual risk behavior. This pattern of results may indicate that youths engage in risky behavior because of their reaction to stressful situations, rather than a response for relief of depressive symptoms. In other words, emerging adults with prior exposure to stressful life events appear to be at elevated risk for engaging in sexual risk behaviors.

The results support the notion that sexual risk behavior could be maladaptive responses to stressful life events from earlier life stages. Several studies have shown support for different types of stressful life events being linked to a variety sexual risk behaviors. For instance, Kaufman et al., (2004) used data on 289 young people, ages 17-25 to examine the relationship of risky sexual behavior (e.g., number of casual partner) and traumatic life events (e.g., had ever been robbed, mugged, or attacked). They found that youths with a known history of traumatic stressors had a 20% of likelihood of having multiple casual partners in the prior year compared to 9% of those with no history of

Existing empirical studies provided support for the conjecture that negative life stressors may evoke maladaptive coping responses as a way to deal with these stressors (Ferguson & Zimmerman, 2005), including sexual risk behaviors (Murry, Simons, Simons, & Gibbons, 2013) and excessive alcohol and/or drug use (Martin, Tuch, & Roman, 2003). Whether adaptive or maladaptive, the manner in which adolescents cope with life stressors may tend to remain stable over the adult life span. In a four-year, longitudinal study, Murry et al., (2013) found that adolescents who were affected by negative life events were more likely to engage in HIV-related risk behaviors during the transition into young adulthood. They also suggested that no single pathway or set of life stressors appear to be the root cause for these maladaptive behaviors, but risky behaviors may also be reflective of the social context or setting in which youth live. Murry et al., (2013) reported that the presence of stressful life events combined with the lack of social support from parents increases the risk of developing maladaptive coping strategies (including risk behaviors) from late adolescence into young adulthood.

**Specific Aim 2**

The second aim of this study was to explore the effects of adolescents’ unhealthy coping strategies on the relation between stressful life events, depressive symptoms, and emerging adults’ sexual risk behavior. The following two hypotheses were proposed to investigate the effect of unhealthy coping on sexual risk behavior:
**Hypothesis 2a:** Higher stressful life events at Wave II will be associated with unhealthy coping strategies at Wave II, which in turn has a positive direct effect on risky sexual behaviors at Wave III.

**Hypothesis 2b:** Unhealthy coping strategies at Wave II will mediate the relationship between depressive symptoms at Wave I and sexual risk at Wave III (indirect effect).

Findings showed that unhealthy coping strategies (i.e., substance use) had a direct significant effect on sexual risk behavior. There was a direct positive relationship between adolescent stressful life events and unhealthy coping. However, there was no direct relationship between adolescence stressful life events and emerging adulthood sexual risk behavior in the presence of unhealthy coping during adolescence in the model 2a. Further, adolescent unhealthy coping (substance use) mediated the relationship between adolescent depressive symptoms and emerging adult sexual risk behavior (model 2b). Unhealthy coping during adolescence exercises both a direct and mediated effect upon sexual risk behavior during emerging adulthood; however, as indicated by the structural equation model, unhealthy coping had a weak indirect negative effect on sexual risk behavior through depressive symptoms at Wave I.

The above finding is similar to that of Elkington et al. (2010) who found that substance use fully mediated the association between psychological distress and consistent condom use, as the effect of psychological distress became insignificant after entering recent substance use into the regression model. Findings from this research team indicated that psychological distress appears to have an indirect association with sexual
risk behavior (both frequency of sexual intercourse and condom use) through substance use in a sample of mostly African-American adolescents (9th to 12th grades) (n = 850). The authors offer a possible explanation for this finding. In addition to impaired judgement skills, substance use may reduce rational decision making ability and ability to safely negotiate sexual activity; thus putting youths at increased risk for engaging in high-risk sexual activities (Elkington et al., 2010).

Available literature on adolescent coping suggests that substance use may be a consequence of mental health problems. In other words, adolescents may use substances as a coping mechanism during times of distress. For example, in a qualitative study of 923 adolescents with substance use problems, many adolescents mentioned that they continued using substances to help them cope with negative experiences (Titus, Godley, & White, 2007). Put it simply, mental health problems (e.g., exposure to stressful life events) may lead to increased substance use and, consequently, increased risky behaviors. In the current study, the significant direct relationships between earlier depressive symptoms and unhealthy coping (substance use) may confirm the validity of making such an assumption about substance use being a consequence of psychological distress. On the other hand, introducing stressful life events into the models illuminated an interesting finding—use of substances (or unhealthy coping) reduced the effects of stressful life events, so that the direct relationship between exposure to stressful life events during adolescence and sexual risk behavior in emerging adulthood were no longer statistically significant. These results point to an explanatory mechanism: adolescents experiencing
stressful life events may use substances to deal with stressors, which, in turn, lead to poor decisions with regard to sexual risk behaviors.

One possible explanation for the association between adolescent unhealthy coping and sexual risk behavior in emerging adulthood is the fact that substance use that starts at an early age tends to continue well into adulthood. Although peak in the use of illicit drugs occurs during emerging adulthood (SAMHSA, 2013, p.21), research has found that substance use that starts in high school is one of the strongest predictors of cigarette use, heavy drinking, marijuana use, cocaine use, and misuse of prescription drugs in later life (Merline et al., 2004; White et al., 2006). Consequently, these unhealthy coping strategies may result in an undesirable increase in sexual risk behavior including greater number of sexual partners (Santelli et al., 1998) and inconsistent condom use (Wingood & DiClemente, 1998).

**Specific Aim 3**

The third set of aims involved testing the relations between adolescents’ stressful life events, depressive symptoms, problem-focused coping, social support from family and emerging adults’ sexual risk behavior, as well as STIs. The following two hypotheses were proposed to investigate the effect of adolescent problem-focused coping strategies, stressful life events, and depressive symptoms on emerging adulthood sexual risk behavior:

**Hypothesis 3a: Higher levels of problem-focused coping at Wave I will be associated with fewer stressful life events at Wave II, which in turn leads to less risky
sexual behaviors (direct and indirect effects). Stressful life events were hypothesized to have direct positive effects on STI.

**Hypothesis 3b:** Higher problem-focused coping at Wave I will be associated with less depressive symptoms at Wave II, which in turn leads to less risky sexual behaviors (direct and indirect effects). Depressive symptoms were hypothesized to have direct positive effects on STI.

**Problem-focused Coping Strategies and Adolescent Mental Health**

Results from the SEM analysis indicated that problem-focused coping had a negative direct effect on stressful life events in adolescence. Problem-focused coping strategies may serve as a protective factor against the stressful life events. As noted in Figures 20 and 21, the models proposed that problem-focused coping strategies were directly related to both stressful life events and depressive symptoms. However, these direct correlations were weak in magnitude (below 0.20). One explanation for the weak relationships might have to do with the measure of stressful life events. For example, larger correlations might have characterized these data if stressful life events had been measured across a larger number of stressors. In line with these findings, Kardum & Krapic (2001) found that adolescents’ problem-focused strategies were associated with stressful life events in a sample of young adolescents; however, correlations achieved in the aforementioned study were greater in magnitude than those reported in the present study. This difference may be due, in part, to the diversity of adolescent stressful life events measurement used. For example, Kardum & Krapic (2001) developed a 50-item scale to assess a wide range of stressful life events linked to family relationships (e.g.,...
fights with parent), relationship with peers (e.g., arguments with classmates), and problems connected with school (e.g., bad grades in school).

The measurement of problem-focused coping used in this study may also contribute to the weak relationships between coping and both stressful life event and depressive symptoms (see Figures 20 and 21). For instance, Compas et al., (1988) found a significant moderate correlation between problem-focused coping strategies and life stressors among adolescents. This study also measured stressful life events and problem-focused coping strategies in a different manner than the present study. Compas et al., (1988) used the Ways of Coping Checklist to examine the broad category of problem-focused coping skills in response to a wide range of specific stressors. The current study, however, used a brief 4-item measure to evaluate problem-focused coping and, thus, may have provided an incomplete assessment of coping skills. Future research should consider the issue of scale, asking what scale reflects appropriate complexity and diversity of problem-focused coping responses (e.g., assistance seeking, planning, taking direct action).

Problem-focused coping deficits have been specifically linked to depressive symptoms in several studies with adolescents (Spence, Sheffield, & Donovan, 2002; Silk, Steinberg, & Morris, 2003; Ireland et al. 2005). In these studies, depressive symptoms have been positively correlated with use of maladaptive coping strategies (e.g., avoidant coping strategies) and negatively linked to adaptive coping (e.g., problem-focused coping strategies). Thus, adolescents lacking effective coping strategies may be more vulnerable to the development and maintenance of depression.
In the current study, given the model specified by Hypothesis 3b did not produce a good fit, the relationship between problem-focused coping and depressive symptoms should be interpreted with caution, but may suggest that adolescent problem-focused coping strategies are negatively associated with depressive symptoms. Coping efforts appear to play an important role in the onset or maintenance of depressive symptoms in adolescents. The model for Hypothesis 3b did not fit the data well potentially because an additional source of correlation between problem-focused coping strategies and depressive symptoms was not taken into account in the model. For example, Spence et al. followed 733 adolescents, ages 12 to 14 years, in 2002 and one year later to determine whether depressive symptoms levels were predicted by negative life events in the previous 12 months and negative problem solving coping strategies. They found that baseline poor problem-focused coping strategies were correlated with follow-up depression only in presence of negative life events.

**Problem-focused Coping and Emerging Adults’ Sexual Risk Behavior**

When considering the context of sexual behavior, significant associations between adolescents’ stressful life events and young adults’ sexual risk behavior did emerge for emerging adults. The results suggested that adolescents increased exposure to stressful life events may directly lead to more young adults’ sexual risk behavior. The findings support the results of previous studies that have shown stressful life events to be linked to sexual risk-taking (Kaufman et al., 2004). Ultimately, findings support the hypothesis that adolescents’ problem-focused coping strategies may be indirectly associated with emerging adults’ sexual risk behavior through decreasing in stressful life events.
Research on the relationship between stressful life events, coping strategies, and sexual risk behavior has been conducted almost exclusively among gay/bisexual men and research is needed on this association among adolescents and emerging adults (Folkman, Chesney, & Philips, 1992; Han et al., 2014). Coping mechanisms are likely to be key factors in the relationship between mental health and sexual risk behavior and may in part explain how such life stressors would be related to sexual risk behaviors in both adolescents and emerging adults. To date, the role of adolescents’ stressful life events on emerging adults’ sexual risk behaviors has not been explored adequately, nor has the role of protective factors. This study, however, attempted to fill these gaps in knowledge by providing a better understanding of the complex relationships between psychosocial factors during adolescence and sexual risk behavior during emerging adulthood.

Identifying appropriate coping strategies that improve adolescents’ ability to deal with stressful life events and minimize sexual risk behaviors is potentially important for the development of successful interventions among both adolescents and emerging adults.

In adolescence, several studies have shown that coping styles have been associated with increased sexual risk behavior (Jones et al., 2014; Ream & Savin, 2005). Research with adults (Barrett et al., 1995; Lyle, 2006), adolescents (Hulland et al., 2015; Teva, Bermudez, & Buela-Casal (2009), and emerging adults (White et al., 2014) supports the importance of problem-focused coping strategies. For example, Steiner et al. (2002) examined the relationship between coping styles and health risk behaviors (e.g., sex-related risks) among adolescents. In a sample of 1,769 high school students, it was found that problem-focused coping was negatively associated with health-risk behaviors.
However, adolescents’ problem-focused coping strategies have been examined less frequently in studies of sexual risk behavior among emerging adults.

It is important to consider an explanation for why adolescents’ problem-focused coping skills were linked with emerging adults’ sexual outcomes as was predicted, given that problem-focused coping skills were measured only at one time in 1995 (Wave I). One possible explanation is that individuals display some stability in the use of coping strategies to deal with life stressors over time. Hampel and Petermann (2005) stated that problem-focused coping strategies may be particularly resistant to change. Similar results were reported by other investigators (Compas, Malcarne, & Fondacro, 1988; McKernon et al., 2001; Kirchner et al. 2010). This finding of the stability of problem-focused skills across time is very important because it has implications for health care professionals who work with adolescents. Findings from this dissertation point to the importance of intervening at a young age in order to help adolescents develop more problem-focused coping strategies (Gil et al., 1997).

One example of promising prevention strategies for increasing problem-solving skills includes Problem-Solving Therapy (PST). PST includes at least 4-6 sessions, 20-30 minutes each, that focus on teaching problem solving to prevent and reduce psychological distress. Treatment involves teaching clients to identify problems, brainstorm solutions, decide on a solution, implement the solution, and then evaluate whether it was effective. PST has demonstrated efficacy across a wide range of populations, including adolescents with behavioral disorders. In a meta-analysis of 21 studies utilizing PST, a cognitive-behavioral intervention focusing on training in
problem-solving skills and attitudes, Bell & D'Zurilla (2009) concluded that PST was an effective intervention for reducing depressive symptomatology and also as effective as other psychological therapies and medication treatments. The PST approach is also important for eliminating the negative effects of life stressors through engaging adolescents in problem solving activities as well as making it easier for adolescents to cope more effectively with these problems (Eskin, Ertekin, & Demir, 2007).

Another potential example of an intervention for enhancing problem-solving skills in adolescents is the Becoming a Responsible Teen (BART) project, which was endorsed by the CDC’s Division of Adolescent and School Health (DASH). BART is an 8-week community-based HIV prevention program aimed at providing adolescents with knowledge, motivation, and behavioral skills to help them make and maintain changes in their behaviors to reduce their risk for acquiring HIV/AIDS. The curriculum combines weekly group discussions on AIDS education, sexual decision-making skills, problem-solving skills, as well as behavioral skills training on assertion, refusal, and social support. At 1-year follow-up, those in the intervention group reported a significantly greater reduction in frequency of unprotected sexual intercourse, delay in the onset of first sexual intercourse, significant increases in condom use, and increases in behavior skills (e.g., assertion or refusal skills), compared to control group (St. Lawrence, Brasfield, Jefferson, Alleyne, & O’Banno, 1995).

Although findings from this dissertation showed that adolescents’ problem-focused coping resulted in fewer depressive symptoms, tested models did not confirm that depressive symptoms had direct correlations with emerging adults’ sexual risk
behavior. This lack of association is somewhat surprising, given the substantial body of literature providing empirical support on the association between depressed mood and risky sexual behavior among youth. For example, Shrier et al., (2001) found that the male adolescents with high levels of depressive symptoms at baseline were significantly more likely than those with low symptom levels to engage in unprotected sex, and among females, high levels of depressive symptoms was associated with positive history of STIs. Studies of the longitudinal effects of depressive symptoms on youths’ risky sexual behavior have also supported this possibility. For example, in a study of 4,152 youths aged 15 to 26, Lehrer et al. (2006) noted that those with high depressive symptom levels at baseline were more likely to report sexual risk behaviors (i.e., condom nonuse at last sexual intercourse, birth control nonuse at last sex, and substance use at last sex) during 1 year of observation. However, the association between STI incidence and depressive symptoms has been reported to be stronger for adolescents when compared to young adults (Mazzaferro et al., 2006).

**Hypothesis 3c and Hypothesis 3d**

The following two hypotheses were proposed to investigate the effects of adolescent social support, stressful life events, and depressive symptoms on emerging adulthood sexual risk behavior:

*Hypothesis 3c:* Higher levels of perceived social support from family and friends at Wave I will be associated with fewer stressful events at Wave II, and less risky sexual behaviors at Wave III (direct and indirect effects). Stressful life events were hypothesized to have direct positive effects on STI at Wave III.
**Hypothesis 3d**: Higher levels of perceived social support from family and friends at Wave I will be associated with fewer depressive symptoms at Wave II and less risky sexual behaviors at Wave III (direct and indirect effects). Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

**Family Social Support and Mental Health**

Social support, when understood in the context of a direct relationship, may actually act to decrease both depressive symptoms and stressful life events among adolescents. In the structural equation model testing this notion (Hypothesis 3c, family social support), the path from family social support to stressful life events was, as expected, negative and significant; family social support does reduce adolescents’ reporting of stressful life events. This is in line with other studies that found that a lack of familial support in adolescence is often associated with more distress, higher levels of problem behavior, and lower life satisfaction (DuBois et al., 1994; Frey & Rothlisberger, 1996; Weigel, Devereux, Leigh, & Ballard-Reisch, 1998; Windle, 1992). Also consistent with the present findings, a two-year longitudinal study by DuBois et al. (1994) showed that parental support was related to higher grade point average, lower psychological distress, and less likelihood of drug use in a sample of 159 US adolescents. However, this study measured different outcomes and did not provide any information on how lack of support from family influences sexual risk behavior among youth.

The mechanism through which social support may influence coping with stressful events could be explained in two ways. One is that social support has a direct effect on mental health regardless of whether an individual finds him or herself in a threatening or
stressful situation (main effect model). This theory has led to the suggestion that social support may play a role in the prevention of stressful life events (Cohen & Wills, 1985; Frey & Rothlisberger, 1996). The current findings provide support for the notion that parents’ social support had a direct effect on depressive symptoms and stressful events in adolescence.

Another explanation is that social support is hypothesized to act as buffering agent under stressful circumstances (Stress Buffering Hypothesis) (Berkman & Glass, 2000). According to the Stress Buffering Hypothesis, perceived social support may serve as a coping resource; that is, it can buffer the deleterious impact of the stressful events in a person’s life by modifying stress appraisal or by giving coping assistance (Veiel & Baumann, 2014; Schreurs & de Ridder, 1997). However, the current study did not investigate the potential buffering effect of social support on mental health. Future research should examine whether social support can provide a buffering effect against the negative consequences of stressful life events and depressive symptoms.

**Family Social Support and Sexual Risk Behavior**

The path from family social support to stressful life events was estimated to be negative, while the indirect path through stressful life events to sexual risk behavior was also negative. Therefore, the conclusion has to be that social support may reduce experiences of stressful life events, which in turn reduces sexual risk behavior in emerging adulthood. Moreover, it is important to note that in this model the direct path from social support to sexual risk behavior was also found to be negative but not statistically significant. This provides insights into the protective mechanisms against
sexual risk behavior. Although the current study did not find a significant direct effect for social support on sexual risk behavior, many studies on risky behaviors have reported findings that support this notion. For example, Aonowitz et al., (2005) suggested a direct relationship between social support from parents and risky behaviors. In Aonowitz et al.’s (2005) study, adolescents who felt closer to their parents were less likely to be involved in risky sexual situations. However, in the current study, social support from family was found to have an indirect effect (through stressful life events) on sexual risk behavior in emerging adulthood.

This finding was consistent with previous studies which showed that social support was found to correlate with sexual risk behavior among emerging adults (Adedimeji, et al., 2009; Basen-Engquist, 1992; Sidze & Defo, 2013; Schwartz et al., 2009). One study reported that young adults with higher perceived social support from family were less likely to engage in unprotected sexual intercourse (Basen-Engquist, 1992). Another indicated that adolescent and young adult (aged 15-24) perceptions of family connectedness were protective against having multiple sexual partners and sexual initiation (Sidze & Defo, 2013). According to a study by Schwartz et al. (2009) among college students (aged 18-22), those who reported higher perceptions of relationships with their parents in adolescence were less likely to engage in unsafe sexual behavior during emerging adulthood compared to those who reported lower levels of parent-adolescent relationship.

However, the findings of the present study are inconsistent with those of Dixon et al., (2001) who failed to find a role for social support from partner, family members, or
friends as a mediator of sexual risk behavior among young adults (aged 18-35). They are also inconsistent with results from Stillo (2014) in which perceived social support, as measured by the Social Provisions Scale, was not associated with the frequency of risky sexual behaviors in the past six months in emerging adults (aged 18-25).

Perhaps different scales to measure social support are one explanation for these inconsistent findings. The measurements for social support varied across studies. For example, Sidze & Defo (2013) developed their own measure of parent-child communication and also included one single-item instrument to measure parent-child connectedness, which potentially limits interpretations of the findings. Another potential reason for the inconsistent findings regarding the effect of social support on sexual risk behavior is that social support is a multidimensional construct that requires complex tool for its evaluation. There are at least three broad dimensions that have been represented in the available literature: 1) social connectedness (Sidze & Defo, 2013); 2) perceived social support or support appraisals (Stillo, 2014); and 3) actual or enacted social support (Herzberg et al., 1999). Studies typically measure only one dimension of social support, which may limit generalization to the multidimensional construct of social support. The influence of social support on risk behaviors then varies with these different dimensions of social support in terms of direction and statistical significance. In this study, the scale used to measure support from parents evaluated only one dimension of social support and could not provide a comprehensive picture of social support.
Effects of Stressful Life Events and Depressive Symptoms on STI

Findings indicated a significant correlation between stressful life events during adolescence and rates of STIs in young adulthood. This finding is in line with the results of Pitzner et al. (2000). The authors reported that having a positive history of traumatic life events (e.g., natural disaster, experienced injuries, and maltreatment) increases the risk of later STIs. However, results from the study by Pitzner et al., (2000) are limited to an adult population and, thus, might not be applicable to adolescents. Overall, research testing the hypothesis that stressful life events during adolescence causes or contribute to subsequent STIs has thus far been very limited, but could be an important area for future investigation.

Extensive research has also supported that adolescents with depression are more likely than those without depression to acquire STIs (DiClemente & Ponton, 1993; Ethier et al., 2006; Shrier, Harris, & Beardslee, 2002; Mazzaferro et al., 2006). Previous studies have also indicated that elevated depression symptoms may increase susceptibility to subsequent STIs in young adult samples (Sales et al., 2010; Tolou-Shams, et al., 2012). However, little is known about how adolescent depressive symptoms affect the rates of STIs among young adults. To date, only one study has been published that investigated the longitudinal relationships between adolescent depressive symptoms and emerging adult acquisition of STIs; this study also used data from the Add Health study. Khan et al. (2010) found that depressive symptoms during adolescence were positively associated with STI acquisition in emerging adulthood; however, this association was only found to be true for black males. In the present study, the results for Model 3c and 3d indicated that higher levels of depressive symptoms and stressful life events at Wave II were
directly associated with STIs in emerging adults, although the estimated coefficients were weak. One explanation for this weak relationship may not be because such an association does not exist, but rather that STI may be more strongly associated with current depressive symptoms but not history of depression. In short, the association between depression during adolescence or recent depressive symptomatology and STIs in emerging adulthood remains as an important area for future research.

**Friends’ Social Support**

The findings involving the measure of social support from friends indicate that the model did not fit the data well; therefore, results have to be considered with caution. This result suggests that having more social support from friends at Wave I is predictive of having more stressful life events at Wave II, which in turn increased levels of sexual risk behavior at Wave III. Two possible reasons for the unexpected results can be considered. First, this finding might have been due to the measure of friends’ social support. Friends’ social support was assessed with only two dichotomous items, the reliability of which is questionable. It is possible that the measure of friends’ social support included in this analysis was not detailed enough to fully tap the construct it was originally intended to measure.

Second, another possible explanation for the unexpected finding of positive association between friends’ support and stressful life events and depressive symptoms might be that this sample was composed of adolescents who can rely on parental social support to cope with the stressful life events included in this analysis. In an investigation of 154 adolescents, Feiring, Taska, and Lewis (1998) found that perceived social support
from friends in the absence of support from parents may put youths at risk for poor adjustment, as well as becoming involved in inappropriate and/or illegal activities. This idea could have been tested in the current study by including both measures of family and friend support in the same model to see if friend support still remained positive.

The findings that social support from friends showed positive relationships with both stressful life events and depressive symptoms could also be related to the fact that family and friends function differently in adolescents’ social network. Friends mainly provide support in day-to-day problems; however, adolescents would rather turn to their parents than to their peers in emergency situations (Frey & Rothlisberger, 1996). DuBois et al. (1994) examined relations of negative life events and social supports from family and friends to psychological distress and school performance. The results obtained by these authors indicated that both stress and support variables were significant predictors of subsequent psychological distress, family support was significantly related to changes in depressive symptoms from Wave I to Wave II. But friend support at Wave I did not appear to be a significant predictor of changes in depressive symptoms, which was inconsistent with other studies that found support from friends to correlate with psychological adjustment.

**Predictability of Models**

Results from this study created three main statistical models for predicting sexual risk behaviors. The first model included only stressful life events and depressive symptoms as predictors of the outcome variable and the amount of the explained variance was 30 percent. Model 2 included stressful life events, depressive symptoms, and
unhealthy coping, with 12 percent of variance explained from these predictors. Model 3 included problem-focused coping, social support from family, stressful life events, and depressive symptoms was able to explain 23 percent of the variance. In this study, the best predictive model seemed to be Model 1, relying on only depressive symptoms and stressful life events. These results suggest that efforts to reduce risk behavior among youth should address psychological and social factors that influence those behaviors. Success in reducing sexual risk behaviors among youth will require evidence-based programs that integrate the efforts of parents, families, and young people themselves. This suggestion will be discussed further in the section on the implications for practice.

In the next section, the study’s limitations that may affect generalizability of the results are discussed, followed by the directions for future based on this research. Finally, the implications for practice are presented.

Limitations

Although the current study has the strengths of a large, nationally-representative sample, its conceptual framework, as well as a prospective design, its design has some limitations. First, it was a secondary analysis of the Add Health data; the original data were not collected to achieve the present study goals. The variables in the dataset had been measured differently than those that would be applied in a research study specifically designed to investigate the present study’s hypotheses. For example, a more comprehensive list that measures more dimensions of problem-focused coping strategies (including problem-solving, assertiveness, and communication and social skills) would be used if the opportunity was present (Stellman, 1998, p.34), rather than the composite of
the four items that exclusively measured the problem-solving skills. Further, problem-focused strategies were measured only at one time in 1995 (Wave I). These specific coping skills may have undergone a great deal of transformation later during the course of the study but were not measured. Therefore, future studies should include a more recent data in order to determine the effects of adolescent coping skills on emerging adult sexual risk behavior. In addition, some very important aspects of stressful events (e.g., juvenile conviction or detention) were not included in the study because they were not asked about during either the Wave I or Wave II surveys.

In the Add Health study, assessing sexual behavior, exposure to stressful life events, and depressive symptoms relied largely on retrospective self-reporting methods, such as the number of partners within the previous 12 months, and as a result, this strategy may have negatively affected recall and reduced the accuracy of reports (Schroder, Carey & Vanable, 2003; Field, McCabe, & Schneiderman, 2013, p.183). In addition, self-reports of sensitive behaviors such as sexual activity (e.g., use of condom at last intercourse or number of sexual partners) might give an under-estimate or an over-estimate of the true situation (Schroder, Carey & Vanable, 2003).

Despite these limitations, the strengths of the current study include exploring evidence of mediation as well as investigating main effects of multiple protective and risk factors. Most significantly, to the best of the researcher’s knowledge, the current study was the first analysis to investigate the association between social support, coping, stressful life events and depressive symptoms in the context of sexual risk behaviors in a longitudinal analysis using path analysis. Further, the study used a large longitudinal
dataset from a nationally representative sample of adolescents, as well as survey weights, increasing generalizability of findings.

Moreover, the present study used laboratory-confirmed tests for STIs, whereas several previous studies used self-reported data (Shrier et al., 2001; Shrier et al., 2002). Because the majority of STIs is asymptomatic, self-reports can lead to substantial underreporting of STIs; thus, this may have introduced some bias into previous studies.

**Directions for Future Research**

Findings from this dissertation study suggest important directions for future research. First, there was an unexpected positive association between the mental health of adolescents and their friends’ social support. A better measure of friends’ social support is definitely needed in future studies. For example, a measure that includes multiple questions about support from friends (e.g., Multidimensional Scale of Perceived Social Support) would improve reliability, lead to a better understanding of the complexity of the peer domain, and provide better information about the effect of friends’ social support on adolescence and emerging adulthood mental and sexual health.

This research study should be replicated with a sufficient power and sample size. Due to the problem of too much power, even small effects were found to be significant in the present study. This may have resulted in findings that were statistically significant but did not have any real practical significance. Estimating power prior to data collection can help future researchers determine what sample size is large enough to yield the desired precision but not so large to produce extremely small effect sizes that have no practical significance (Ho, 2013, p.396).
Further research is also needed regarding variables (e.g., social support, coping skills) that moderate the relations between depressive symptoms or stressful life events and the emerging adults’ involvement in risky behaviors. According to the Stress Buffering Hypothesis, social support work as a buffering factor against the negative impacts of stressors. Future research may explore whether social support from different resources (e.g., family, peer) moderate the relationship between adolescence stressful life events and emerging adulthood sexual risk behavior.

Another area for future research would be to examine mediating mechanisms that underlie the relationship between adolescent mental health problems (e.g., depression, stressful life events) and emerging adult sexual risk behavior. Although social support and coping skills are important factors in sexual risk taking, they do not appear to be the most important predictors of behavior; rather, a variety of individual (e.g., sexual beliefs, motivations, and previous sexual behavior) and environmental (e.g., neighborhood) factors may help explain why emerging adults continue to engage in risky sexual activities (Kirby & Lepore, 2007). It is possible that other mechanisms exist as well and therefore future research is needed to explore this issue. Future research should address this possibility.

Study findings also highlight the need for longitudinal research to target the developmental period between adolescence and emerging adulthood. This study attempted to gain a greater understanding of adolescents’ exposure to stressful life events and problem-focused strategies on emerging adults’ involvement in sexual risk behavior. The effect sizes were small but, nevertheless, early adolescent problem-focused coping
strategies were indirectly associated with sexual risk behavior through stressful life events in emerging adulthood. However, it is yet unknown if benefits of coping interventions that focus on teaching problem-solving skills in early adolescence will persist into emerging adulthood. Longitudinal research on this population allows investigators to examine developmental processes that influence coping responses into emerging adulthood.

Finally, this study did not provide information regarding other possible mediating mechanisms such as self-efficacy (Schwarzer & Luszczynska, 2005, p.154; Ethier et al., 2006), self-esteem (Salazar et al. 2005), as well as attitudes, values, and beliefs pertaining to sexual behavior, through which social support may reduce sexual risk behavior. Further research is required to employ additional mediation tests to examine new and understudied mechanisms.

**Implications for Clinical Practice**

Overall, nurses, clinicians, and other health professionals can benefit from understanding the outcomes of this research. The present study found that social support from parents in early adolescence may play an important role in the reduction of exposure to stressful life events, which may in turn serve as an important deterrent of sexual risk behaviors in emerging adulthood. Psychiatric nurses and other mental health professionals need to be cognizant of the link between adolescents' stressful life events, social support from family, and sexual risk-taking among emerging adults and be particularly sensitive to these HIV protective and risk factors in assessment and treatment of youth. Health care professionals working with youth may use screening assessment
techniques, such as HEADSS (home, education, activity, drugs, sexuality, and suicide assessment), for early identification of at-risk adolescents sooner and lead to more successful use of timely, tailored preventive interventions (Cohen et al., 1991). If screening is positive, further evaluation of the event and its meaning or significance should take place. Protective factors between events and negative consequences include family social support and coping styles, and therefore, assessment of the adolescent’s social support system and the way in which individuals cope with stressful events or major changes is important.

Findings from this dissertation also highlight the importance of early substance use screening in adolescents. Substance abuse prevention during adolescence may delay the onset of substance use and subsequent sexual risk behavior. Despite the association between mental health, substance use, and risky behaviors, in sexual risk prevention programs for adolescents, risk assessments tends to focus particularly on an individual's sexual risk (Elkington et al., 2010). Based on the findings of this study, risk assessments should also focus on psychological distress and substance use prevention while addressing sexual risk. Several adolescent substance use screening tools are available. One example of evidence-based screening tool that is free and easy to use is the Problem Oriented Screening Instrument for Teenagers (POSIT). This 139-item self-administered “yes/no” screening questionnaire was designed to detect problem substance use and nine other problem areas needing further assessment: physical health, mental health, family relations, peer relationships, educational status, vocational status, social skills,
leisure/recreation, and aggressive behavior (Rahdert, 1991). The major advantage of the POSIT tool is its ability to focus on the mental health problems as well as substance use.

Youth may need to learn how to obtain adequate social support, since a lack of family support has been hypothesized to increase vulnerability to stressful life events, which may, in turn, increase sexual risk behavior in emerging adulthood. In light of the study findings, enhancing parenting skills involving warmth, affection, and nurturance may influence adolescent mental health directly and affect sexual risk behavior indirectly through reducing stressful life events in adolescence. Mental health professionals could work with parents to help them learn ways to demonstrate caring and affection toward their children, as well as understand the importance of parental relationships as adolescents approach adulthood. They could also design parenting programs that involve both parent and adolescent. There are a number of interventions to promote parental support and life skills in adolescence, but most such programs have not been assessed experimentally or among different representative samples of adolescents.

A notable example of this type of intervention for adolescents is called Mother-Daughter Choices (Peters, 1988, p.138), which provides the opportunity for mothers and their daughters in early adolescence to spend time together and to share their love and feelings with one another. The program also provides youth with valuable life-skills, including goal setting, problem solving, responsible decision making and assertiveness, and responsible behavior as adolescents move into emerging adulthood. Although the impacts of potential changes are not yet known, the program has been initially evaluated
to determine participants’ satisfaction. Results indicated high satisfaction ratings for users, especially for moms (Meschke, Bartholomae, & Zentall, 2000).

Staying Connected with Your Teen is also a good example of a successful family program. The program designed for adolescents 12 to 17 years old and their parents to prevent high-risk sexual activity, substance use, and risky sexual behaviors (Haggerty, McGlynn, & Klima, 2013). The intervention can be group- or self-administered videotaped programs. The group administered intervention is composed of seven two-hour sessions that is typically based on social development strategy and offer lessons about how parents can increase their ability to relate to their teens, identifying risk factors before problem behaviors develop, and promoting family problem-solving. This program has been tested and shown to be effective in increasing use of condoms, decreasing substance use such as alcohol and drugs, and reducing the risk of sexually transmitted diseases (Pollard, 1998; Haggerty et al., 2007; Haggerty, McGlynn, & Klima, 2013).

There are also several examples of intervention programs specifically designed for specific groups of young people such as runaway youth (Arnold & Rotheram-Borus, 2009), adolescent children of mothers living with HIV (Rotheram-Borus et al., 2014), and adolescents in low-income housing developments (Sikkema et al., 2005). For example, STRIVE project, a 5-session family-based intervention, was designed to reduce the number of runaway episodes and minimize HIV-associated sexual and substance use-related risk behaviors through improving family communications, reducing family stress, and enhancing negotiation, problem solving, and coping skills for dealing with conflicts.
This program appears to have been successful in reducing the number of sexual partners in runaway and homeless adolescents (Arnold & Rotheram-Borus, 2009).

Finally, the relationship between problem-focused coping strategies and stressful life events seems to be consistent with the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) in which greater problem-focused coping strategies reduce the impact of stressors. Thus, teaching effective coping strategies, particularly problem-focused skills, to adolescents is an important and necessary component of any program for prevention of exposure stressful life events. Positive coping skills teaching can include problem-solving and techniques of healthy emotional regulation. This research has identified two examples of effective interventions in problem-focused coping skills training earlier in this chapter in the section on problem-focused coping and emerging adults’ sexual risk behavior.

**Conclusion**

The present study provided a step towards understanding the relationships between adolescence psychosocial risk/factors (e.g., depressive symptoms, exposure to stressful life events, and perceived social support) and sexual risk behavior during emerging adulthood. This study found a significant direct relationship between adolescent stressful life events and sexual risk behavior in emerging adulthood. This finding from this study suggest that intervention programs addressing sexual risk behaviors may incorporate screening for stressful life events in order to identify high-risk adolescents in need of interventions relative to stress and coping.
This study found no significant direct relationship between adolescent stressful life events and adulthood sexual risk behavior in the presence of unhealthy coping (substance use). As previously stated, unhealthy coping (substance use) mediated the associations between depressive symptoms during adolescence and sexual risk behavior in emerging adulthood. These findings suggest that adolescent reproductive health services should incorporate screening instruments into the sexual risk assessment process to detect risk of mental health concerns in adolescence.

Results also showed that problem-focused coping strategies and social support from family may serve as protective factors against sexual risk behavior. The study also supported the hypothesis that higher levels of depressive symptoms and stressful life events may be associated with STIs in emerging adults. Therefore, psychosocial factors affecting adolescent mental health are relevant to emerging adult sexual risk behavior and should be incorporated in sexual risk reduction interventions in order to produce behavior change for young people.
References


behaviors over 24 months among African-American female adolescents.

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out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *Journal of Studies on Alcohol, 67*(6), 810.


Appendix A: Separate Models for Males and Females

Appendix A contains models for males and females. First, the fit indices were compared across gender; ideally, the model with the best fit has the smallest $\chi^2$/df ratio. In addition to that, the significance of path coefficients in the structural models will also be discussed.

Gender was used as a grouping variable to report gender differences in all measurement models examining the relationship between depressive symptoms, stressful life events, coping, social support, and sexual risk behavior outcomes among adolescents. To achieve this objective, gender was removed from the USEVARIABLES list and GROUPING command was used to identify gender as the grouping variable. To determine the fit of models across male and female groups, fit statistics for each part of the model (male versus female) were used. Since Mplus reports the same p value for both groups, a chi-square to degrees of freedom ratio was reported as measure of fit for SEM models. A ratio close to or smaller than 2.0 is considered an indication of acceptable model fit (Crowley & Fan, 1997). A lower ratio indicates a better model (Kline, 2005).

Specific Aim 1

Specific Aim 1: Examine the relationships between stressful life events, depressive symptoms, and subsequent risky sexual behavior (frequency of sexual intercourse, inconsistent condom use and having multiple sexual partners) during adolescence and emerging adulthood.

Hypothesis 1a: Depressive symptoms at Wave II will be predicted by stressful life events at Wave I independent of depressive symptoms at Wave I, while stressful life
events at Wave II will be predicted by depressive symptoms at Wave I independent of stressful life events at Wave I.

An examination of the within-group fit indices revealed that the model fit well for both male and female adolescents. As shown in Figures 13a and 13b, the measurement models for the male and female samples show acceptable levels of goodness of fit. The model for females had a better statistical fit to the data, $\chi^2/df = 0.14$, and both CFI and TLI were over 0.96. The results of the models for male and female adolescents indicated that all paths were significant and consistent with the overall model.

Figure 13a: Coefficients from Analysis of Hypothesis 1a: Evaluating Bidirectional Relationships between Depressive Symptoms and Stressful Life Events for Males (n = 9,288)

![Diagram]

$\chi^2 = 1.11; df = 2$

$CFI=1.00$

$TLI=1.00$

$RMSEA=0.00$

*p < 0.00.*

Notes:

*CFI=comparative fit index.

*TLI=Tucker-Lewis index.

*RMSEA=root mean square error of approximation.

*Paths from baseline covariates are not shown.*
Hypothesis 1b: Stressful events at Wave II will mediate the relationship between depressive symptoms at Wave I and risky sexual behaviors at Wave III.

Table 10 provides the standardized path coefficients and confidence intervals for examining the direct effects of depressive symptoms at Wave I on sexual risk behavior at Wave III. The results indicated that the ratio of chi square to degrees of freedom was much smaller for the female model ($\chi^2/df = 0.6$ for female vs. $\chi^2/df = 1.76$ for male model). The results demonstrated that across both males and females, the effect of depressive symptoms was mediated by stressful life events. Bootstrapped result indicated a significant indirect effect from depressive symptoms through stressful life events. The
indirect effect of depressive symptoms on sexual risk behavior through stressful life events for both males ($\beta = 0.06; \ SE = 0.00$) and females ($\beta = 0.01; \ SE = 0.00$) had a bootstrapped confidence interval (CI [0.04-0.09] and [0.005-0.032], respectively) that did not contain 0.

**Table 10: Effects from Depressive Symptoms at Wave II to Sexual risk behavior in Males (n = 9,241) and Females (n = 9,584)**

<table>
<thead>
<tr>
<th>Effects</th>
<th>Males</th>
<th>99% CI*</th>
<th>Females</th>
<th>99% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct effect</td>
<td>0.01</td>
<td>-0.04-0.08</td>
<td>0.04</td>
<td>-0.04-0.13</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>0.06</td>
<td>0.04-0.09**</td>
<td>0.01</td>
<td>0.005-0.032**</td>
</tr>
<tr>
<td>Total effect</td>
<td>0.08</td>
<td>0.02-0.14</td>
<td>0.06</td>
<td>-0.03-0.12</td>
</tr>
<tr>
<td>Total indirect</td>
<td>0.06</td>
<td>0.04-0.08**</td>
<td>0.01</td>
<td>0.003-0.03**</td>
</tr>
</tbody>
</table>

Fit Statistics for male model:
- $\chi^2 = 37.08; \ df = 21$
- CFI=0.99
- TLI=0.98
- RMSEA=0.01

* Confidence interval

Fit Statistics for female model:
- $\chi^2 = 12.78; \ df = 21$
- CFI=0.99
- TLI=0.98
- RMSEA=0.01

**Hypothesis 1c: Depressive symptoms at Wave II will mediate the relationship between stressful life events at Wave I and risky sexual behaviors at Wave III.**

Table 11 provides the model and standardized path coefficients for examining the direct effects of stressful life events at Wave I on sexual risk behavior at Wave III. The ratio of chi-square to degrees of freedom was well below the cut-off criterion of adequate fit of 2 only for male model. The result indicated that the ratio of chi-square to degrees of freedom was smaller for the male model ($\chi^2/df = 1.1$) than for female model ($\chi^2/df =
Results of the male model suggest that the effect of stressful life events at Wave I was not mediated by depressive symptoms at Wave II (β = -0.00; SE = 0.00; CI [-0.03-0.01], p > 0.05).

Table 11: Effects from Stressful Life Events Wave I to Sexual risk behavior in Males (n = 9,282) and Females (n = 9,628)

<table>
<thead>
<tr>
<th>Effects</th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>99% CI*</td>
<td>β</td>
<td>99% CI</td>
</tr>
<tr>
<td>Direct effect</td>
<td>0.17**</td>
<td>0.03-0.3</td>
<td>0.03</td>
<td>-0.03-0.10</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>-0.006</td>
<td>-0.03-0.01</td>
<td>0.02***</td>
<td>0.002-0.037</td>
</tr>
<tr>
<td>Total effect</td>
<td>0.16**</td>
<td>0.02-0.29</td>
<td>0.05</td>
<td>-0.02-0.12</td>
</tr>
<tr>
<td>Total indirect</td>
<td>-0.006</td>
<td>-0.03-0.01</td>
<td>0.02</td>
<td>0.002-0.03</td>
</tr>
</tbody>
</table>

Fit Statistics for male model:
χ² = 62.86; df = 57
CFI=0.93
TLI=0.89
RMSEA=0.01

Fit Statistics for female model:
χ² = 160; df = 57
CFI=0.93
TLI=0.89
RMSEA=0.01

* Confidence interval
** P < 0.001
*** P = 0.003

Full Aim 1 Model

The results of the full model for Aim 1 were provided separately for male and female in Figure 16a and Figure 16b. The chi-square to degree of freedom ratios were not satisfactory for either of the models (χ²/df = 2.25 and χ²/df = 2.21 for males and females, respectively). However, the indirect path from depressive symptoms to sexual risk behavior is positive and significant in both models, providing evidence that stressful life events may be a mediator of sexual risk behavior.
Figure 16a: Standardized Path Coefficients of Model 1 for Males (n = 9,241)

χ²=97.07; df=43
CFI=0.98
TLI=0.95
RMSEA=0.01
*p < 0.001; **p < 0.01.
Notes:
CFI=comparative fit index.
TLI=Tucker-Lewis index.
RMSEA=root mean square error of approximation.
Effects from Depressive symptoms Wave 1 (99% confidence interval):
Direct effect: β = 0.02 (0.00-0.11)
Indirect effect: β = 0.03 (0.009-0.05)*
Total: β = 0.05 (0.03-0.18)
Total indirect: β = 0.08 (0.03-0.18)*
Paths from baseline covariates are not shown.
Specific Aim 2

Examine relationships between depressive symptoms at Wave I, unhealthy coping strategies and stressful life events at Wave II, and risky sexual behavior at Wave III.

**Hypothesis 2a:** Higher stressful life events at Wave II will be associated with unhealthy coping strategies at Wave II, which in turn has a positive direct effect on risky sexual behaviors at Wave III.

Fit indices were satisfactory for both male and female models (see Figures 17a and 17b). The female model had a smaller χ²/df ratio compared to the male model (χ²/df = 0.52 vs. χ²/df = 0.89, respectively), indicating that the model was a better fit for data provided by female participants. A positive relationship between stressful life events,
unhealthy coping, and sexual risk behavior was observed for females and males. Stressful life events did not predict sexual risk behavior, but unhealthy coping was a significant predictor for both males ($\beta = 0.21; SE = 0.04$) and females ($\beta = 0.18; SE = 0.04$).

**Figure 17a: Coefficients from Analysis of Hypothesis 2a: Evaluating Relationships between Stressful Life Events, Unhealthy Coping, and Sexual Risk Behavior for Males ($n = 9,429$)**

\[
\chi^2 = 15.22; df = 17 \\
CFI = 0.99 \\
TLI = 0.99 \\
RMSEA = 0.008 \\
*p < 0.001.
\]

Notes:
- CFI=comparative fit index.
- TLI=Tucker-Lewis index.
- RMSEA=root mean square error of approximation.
Hypothesis 2b: Unhealthy coping strategies at Wave II will mediate the relationship between depressive symptoms at Wave I and sexual risk at Wave III (indirect effect).

For the male model, $\chi^2$/df ratio was 1.02, while for the female model $\chi^2$/df ratio was 0.66. The fit statistics for both males and females were satisfactory, indicating that the models provided good fit for the data. Evidence of mediation was found only in females. In females, the estimated indirect effect of depressive symptoms at Wave I on sexual risk behavior through unhealthy coping was significant and the bootstrapping confidence interval did not contain 0 (%99 CI [0.01-0.03]), supporting the mediation model illustrated in Table 12.
Table 12: Effects from Depressive Symptoms Wave I to Sexual risk behavior in Males (n = 9,241) and Females (n = 9,584)

<table>
<thead>
<tr>
<th>Effects</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>99% CI*</td>
</tr>
<tr>
<td>Direct effect</td>
<td>0.08</td>
<td>-0.04-0.24</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>0.00</td>
<td>-0.00-0.02</td>
</tr>
<tr>
<td>Total effect</td>
<td>0.11</td>
<td>-0.03-0.26</td>
</tr>
<tr>
<td>Total indirect</td>
<td>0.01</td>
<td>-0.00-0.02</td>
</tr>
</tbody>
</table>

Fit Statistics for male model:
\( \chi^2 = 21.46; \) df = 21
CFI=0.99
TLI=0.99
RMSEA=0.008
* Confidence interval
** \( P < 0.00 \)

Fit Statistics for female model:
\( \chi^2 = 13.86; \) df = 21
CFI=0.99
TLI=0.99
RMSEA=0.008

Full Model 2

The \( \chi^2/df \) ratio for males was 1.99 and for females was 2.6, which indicated that the male model fitted the data better than female model (see Figures 19a and 19b). Within males, higher stressful life events significantly predicted higher sexual risk behavior (\( \beta = 0.28; SE = 0.03 \)). Correlation coefficients indicated that stressful life events at Wave II was significantly correlated with depressive symptoms at Wave I (\( \beta = 0.22; SE = 0.01 \)) as well as unhealthy coping (\( \beta = 0.19; SE = 0.00 \)). The path coefficients from depressive symptoms to unhealthy coping was not significant (\( \beta = 0.00; SE = 0.01 \)), nor was the path from depressive symptoms to sexual risk behavior (\( \beta = 0.03; SE = 0.03 \)).
Figure 19a: Standardized Path Coefficients for Model 2 for Males (n = 9,241)

χ² = 53.73; df = 27
CFI = 0.97
TLI = 0.94
RMSEA = 0.02
*p < 0.001.

Notes:
CFI = comparative fit index.
TLI = Tucker-Lewis index.
RMSEA = root mean square error of approximation.
Effects from depressive symptoms (99% confidence interval):
Direct effect: β = 0.03 (0.04 - 0.11)
Indirect effect: β = -0.00 (-0.01 - 0.01)
Total: β = 0.01 (0.03 - 0.18)*
Total indirect: β = 0.07 (0.04 - 0.10)*
Paths from baseline covariates are not shown.
Specific Aim 3

Examine the relationships between perceived social support (Wave I), problem-focused coping skills (Wave I), stressful life events (Wave II), depressive symptoms (Wave II), risky sexual behaviors (Wave III), and STIs during adolescence and emerging adulthood.

**Hypothesis 3a:** Higher levels of effective coping at Wave I will be associated with fewer stressful events at Wave II, which in turn leads to less risky sexual behaviors.
(direct and indirect effects) and lower rates of STIs (direct effect) at Wave III. Stressful life events were hypothesized to have direct positive effects on STI.

In both groups, the $\chi^2/df$ ratios were smaller than 2 (0.99 and 0.91 in male and female, respectively), which suggested adequate model fit. Problem-focused coping, directly and negatively, affect stressful life events in both the male ($\beta = -0.04; SE = 0.01$) and female ($\beta = -0.06; SE = 0.01$) models. There was a significant positive correlation between stressful life events at Wave II and sexual risk behavior in both the male ($\beta = 0.27; SE = 0.02$) and female ($\beta = 0.08; SE = 0.01$) (see Figures 20a and 20b).

**Figure 20a: Coefficients from Analysis of Hypothesis # 3a: Evaluating Relationships between Stressful Life Events, Problem-focused Coping, and Sexual Risk Behavior for Males (n = 9,160)**

\[
\begin{align*}
\chi^2 &= 32.89; df = 33 \\
CFI &= 0.98 \\
TLI &= 0.98 \\
RMSEA &= 0.01
\end{align*}
\]

*p < 0.001; ** p < 0.01.

Notes:

CFI=comparative fit index.
TLI=Tucker-Lewis index.
RMSEA=root mean square error of approximation.
Effects from coping (99% confidence interval):
Direct effect: $\beta = 0.05 (-0.03 - 0.09)$
Indirect effect: $\beta = 0.01 (-0.016 to 0.005)$
Total: $\beta = 0.04 (0.004 - 0.07)$*
Total indirect: $\beta = 0.01 (-0.006 to 0.002)$*
Hypothesis 3b: Higher effective coping at Wave I will be associated with less depressive symptoms at Wave II, which in turn leads to less risky sexual behaviors (indirect effect). Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

The models tested across male and female subgroups were presented in Figure 21a and 21b. Both models provided good fit to the data ($\chi^2$/df = 0.77 and 1.2 in males and females, respectively). The coefficients indicated that problem-focused coping at Wave I significantly, negatively and directly affect depressive symptoms at Wave II in males ($\beta = -0.07$; SE = 0.03) and females ($\beta = -0.09$; SE = 0.01). Additionally, depressive symptoms at Wave I were significantly correlated with STIs in both the male
(β = 0.06; SE = 0.01) and female models (β = 0.05; SE = 0.02), but their effects on sexual risk behavior were not statistically significant across these models (β = 0.05, SE = 0.19; β = 0.13; SE = 0.32). The indirect effect of problem-focused coping strategies on sexual risk behavior was significant only for females (99 CI -0.02 to -0.01).

**Figure 21a: Coefficients from Analysis of Hypothesis 3b: Evaluating Relationships between Depressive Symptoms, Problem-focused Coping, and Sexual Risk Behavior for Males (n = 9,159)**
Hypothesis 3c: Higher levels of perceived social support from family and friends at Wave I will be associated with fewer stressful events at Wave II, less risky sexual behavior (indirect effect). Stressful life events were hypothesized to have direct positive effects on STI at Wave III.

Family Support: The $\chi^2$/df ratios indicated a good model across both groups, male ($\chi^2$/df = 1.44) and female ($\chi^2$/df = 1.05). Each model consistently demonstrated negative correlations among the variable of family support at Wave I and stressful life events at Wave II, which had positive correlation with sexual risk behavior. However, the correlation between stressful life events and STIs was only significant for males ($\beta = 0.06$; SE = 0.01). The magnitude of the direct effect of stressful life events on sexual risk
behavior was also greater among males ($\beta = 0.3; \text{SE} = 0.01$ vs. $\beta = 0.08, \text{SE} = 0.01$). For males, Social support from family had a negative significant indirect effect through stressful life events on sexual risk behavior (see Figures 22a and 22b).

**Figure 22a: Coefficients from Analysis of Hypothesis 3c: Evaluating Relationships between Stressful Life Events, Family Social Support, and Sexual Risk Behavior for Males (n = 9,282)**

![Diagram showing relationships between stress, social support, and sexual risk behavior for males.](image)

- $\chi^2 = 56.40$; $df = 39$
- CFI = 0.98
- TLI = 0.97
- RMSEA = 0.01
- $p < 0.001$

*Notes*

- CFI = Comparative fit index.
- TLI = Tucker-Lewis index.
- RMSEA = Root mean square error of approximation.
- Effects from social support (99% confidence interval): Direct effect: $\beta = 0.02$ (-0.09 to 0.01)
  Indirect effect: $\beta = -0.05$ (-0.07 to -0.02)*
  Total: $\beta = -0.04$ (-0.13 to -0.06)
  Total indirect: $\beta = -0.04$ (-0.06 to -0.02)*
Figure 22b: Coefficients from Analysis of Hypothesis 3c: Evaluating Relationships between Stressful Life Events, Family Social Support, and Sexual Risk Behavior for Females (n = 9,359)

Friends Support: The $\chi^2$/df ratios indicated that the model for males had a good fit with a statistic of less than 2 ($\chi^2$/df = 1.17 vs. $\chi^2$/df = 4.36 for females). An unexpected finding was the positive path from friend support to stressful life events, namely higher friends social support led to higher stressful life events for both groups, male ($\beta = 0.08$; SE = 0.01) and female ($\beta = 0.09$; SE = 0.01). The association between stressful life events and sexual risk behavior was in the positive direction in both males ($\beta = 0.36$; SE = 0.04) and females ($\beta = 0.07$; SE = 0.05). As for STIs, stressful life events were not significantly associated with STI, for males only ($\beta = 0.08$; SE = 0.01). Indirect effects of friends’ social support were all positive and statistically significant for both groups (see Figures 23a and 23b).
Figure 23a: Coefficients from Analysis of Hypothesis 3c: Evaluating Relationships between Stressful Life Events, Friends Social Support, and Sexual Risk Behavior for Males (n = 9,283)

\[ \chi^2 = 46.00; df = 39 \]
\[ CFI = 0.96 \]
\[ TLI = 0.94 \]
\[ RMSEA = 0.01 \]

*p < 0.001.

Notes:
CFI = comparative fit index.
TLI = Tucker Lewis index.
RMSEA = root mean square error of approximation.
Effects from social support (99% confidence interval):
Direct effect: b = 0.03 (0.003 - 0.07)*
Indirect effect: b = -0.03 (0.02 - 0.04)*
Total: b = 0.06 (0.03 - 0.10)*
Total indirect: b = -0.03 (0.003 - 0.07)*
Figure 23b: Coefficients from Analysis of Hypothesis 3c: Evaluating Relationships between Stressful Life Events, Friends Social Support, and Sexual Risk Behavior for Females (n = 9,628)

<table>
<thead>
<tr>
<th>Path</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends social support I → Sexual risk behavior</td>
<td>0.09*</td>
</tr>
<tr>
<td>Stressful events II → Sexual risk behavior</td>
<td>0.07</td>
</tr>
<tr>
<td>Sexual risk behavior → STI III</td>
<td>0.08*</td>
</tr>
<tr>
<td>Sexual risk behavior → Condom use III</td>
<td>0.05</td>
</tr>
<tr>
<td>Sexual risk behavior → Number of partners III</td>
<td>0.56*</td>
</tr>
<tr>
<td>STI III → Condom use III</td>
<td>0.09*</td>
</tr>
<tr>
<td>STI III → Number of partners III</td>
<td>0.45*</td>
</tr>
</tbody>
</table>

Notes:
- CFI = Comparative Fit Index
- TLI = Tucker-Lewis Index
- RMSEA = Root Mean Square Error of Approximation
- *p < 0.001

Hypothesis 3d: Higher levels of perceived social support from family and friends at Wave I will be associated with fewer depressive symptoms at Wave II, less risky sexual behaviors (indirect effect). Depressive symptoms were hypothesized to have direct positive effects on STI at Wave III.

Family Support: The measurement models for both males and females had a good fit. The $\chi^2$/df ratio for the male model was 1.54, while for the female model the $\chi^2$/df value was 0.64, which indicated that the measurement model for females fitted the data better than the model for males (see Figures 24a and 24b). As hypothesized, family support had significant direct effects on stressful life events. The indirect paths that linked adolescent family support to sexual risk behavior in young adulthood through
Depressive symptoms were not significant in either the male or female model. In addition, the direct path from depressive symptoms to STIs also reached statistical significance for males and females.

**Figure 24a: Coefficients from Analysis of Hypothesis 3d: Evaluating Relationships between Depressive Symptoms, Family Social Support Sexual Risk Behavior, and STI for Males (n = 9,288)**

![Diagram](image)

- $\chi^2 = 50.01$, df = 4
- CFI = 0.99
- TLI = 0.98
- RMSEA = 0.008

*p < 0.001, **p < 0.01.

Notes:
- CFI = Comparative Fit Index.
- TLI = Tucker-Lewis Index.
- RMSEA = Root Mean Square Error of Approximation.
- Effects from social support (95% confidence interval):
  - Direct effect: $\beta = -0.02 (-0.12 - 0.07)^*$
  - Indirect effect: $\beta = 0.00 (-0.02 - 0.02)^*$
  - Total: $\beta = -0.02 (-0.12 - 0.07)$
  - Total indirect: $\beta = 0.00 (-0.02 - 0.02)$
Friends Support: The Figures 26a and 26b indicates that no model provided a good fit ($\chi^2$/df = 5.75 and 4.69 for male and female, respectively), and most paths were insignificant. Overall, the models did not provide adequate fit to the data.
Figure 26a: Coefficients from Analysis of Hypothesis 3d: Evaluating Relationships between Depressive Symptoms, Friend Social Support Sexual Risk Behavior, and STI for Males (n = 9,270)

$\chi^2 = 199.03; df = 33$
$CFI = 0.90$
$TLI = 0.79$
$RMSEA = 0.03$

*p < 0.001, **p < 0.01.

Notes:
CFI = comparative fit index.
TLI = Tucker-Lewis index.
RMSEA = root mean square error of approximation.

Effects from social support (99% confidence interval):
Direct effect: $\beta = 0.06 (0.01 - 0.10)$
Indirect effect: $\beta = -0.003 (-0.01 - 0.005)$
Total: $\beta = 0.06 (0.009 - 0.10)$
Total indirect: $\beta = -0.00 (-0.01 - 0.005)$
Figure 26b: Coefficients from Analysis of Hypothesis 3d: Evaluating Relationships between Depressive Symptoms, Friend Social Support Sexual Risk Behavior, and STI for Females (n = 9,607)

Full Model 3

The male and female models provided good fit to the data ($\chi^2$/df ratios of 0.69 and 0.65 for males and females, respectively). Problem-focused coping strategies had a significant direct effect on both stressful life events and depressive symptoms for females but not for males. In the Figure 27a, for males, problem-focused coping strategies had only significant relationship with depressive symptoms ($\beta = 0.05$; SE = 0.01). Family support was negatively related to both depressive symptoms and stressful life events in the both models. Although significant positive associations between depressive symptoms and outcome measures, sexual risk behavior and STIs, were significant for
females, significant correlations were not observed in the male model with respect to depressive symptoms. A significant positive association between stressful life events and sexual risk behavior was observed in both males and females, but the association was stronger for males ($\beta = 0.3$ for males vs. $\beta = 0.07$ for females. There was no association between stressful life events and STIs in the female model ($\beta = 0.02; \text{SE} = 0.01$), while a positive association was observed among males ($\beta = 0.08; \text{SE} = 0.01$).

**Figure 27a: Standardized Path Coefficients for Model 3 for Males (n = 18,641)**
Summary

For both male and female adolescents, a higher level of problem-focused coping skills had a negative indirect effect on sexual risk behavior during emerging adulthood through reducing stressful life events. Higher level of social support and problem-focused coping skills were associated with less depressive symptoms and experiences of stressful life events for both male and female adolescents. Perceived social support from family showed an indirect effect on sexual risk behavior for male adolescents, but this effect failed to reach significance for female participants. The effectiveness of social support from parents during adolescence can play a positive role in supporting the male youths against sexual risk behavior.
Appendix B - Institutional Review Board Approval

The IRB: Human Subjects Committee determined that the referenced study is exempt from review under federal guidelines 45 CFR Part 46.101(b) category #4 EXISTING DATA; RECORDS REVIEW; PATHOLOGICAL SPECIMENS.

**Study Number:** 1512E81404

**Principal Investigator:** Maryam Ghobadzadeh

**Title(s):**
Relationship between Adolescent Stress, Depressive Symptoms, Social Support, Coping, and Sexual Risk Behaviors in Young Adulthood

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The study number above is assigned to your research. That number and the title of your study must be used in all communication with the IRB office.

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