

Patterns of Adolescent and Young Adult Sexual Behavior: Predictors & Consequences

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**Abstract**

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While risky sexual behavior can lead to negative consequences such as sexually transmitted infections and unintended pregnancy, sexual behavior also is a healthy part of human development. By understanding the social and cognitive processes that influence sexual behavior choices during adolescence and young adulthood, we will be better able to promote positive sexual health and reduce risky sexual behavior and its negative consequences, including sexually transmitted infection and unintended pregnancy. This dissertation examined three sets of questions related to sexual behavior during adolescence and young adulthood. The first study used structural equation modeling and found that the data supported many of the prosocial developmental paths described by the social development model, for example a positive family and school environment predicted prosocial norms and healthy beliefs, which in turn predicted a later age of sexual initiation. The second study used latent class analysis to identify five classes of sexual behavior from ages 19 to 23. The study showed that while young adult men and women exhibit similar patterns of sexual behavior, there were important differences in the levels of individual sexual risk behaviors within the behavior patterns and in the proportion of males and females estimated to be in the Higher Risky Sex class. This study also showed that risk and protective socialization processes during adolescence impact sexual behavior during young adulthood. The third study used the 5 identified latent classes of sexual behavior, and found that

these classes differentially predict health and social outcomes at age 24. These studies have several implications, including providing support for enhancing prosocial environments at the family, school, and peer levels, providing insight into specific health messaging for young adults to improve their sexual health, and the importance of contextualizing sexual behavior as one component of overall health that is linked to other areas of a person's health.

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## INTRODUCTION

Sexuality is a critical component of overall health (Office of the Surgeon General, 2001). The World Health Organization defines sexual health as a “state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence” (World Health Organization, 2006). While risky sexual behavior can lead to negative consequences such as sexually transmitted infections and unintended pregnancy, sexual behavior also is a healthy part of human development. This dissertation strives to incorporate a holistic and positive understanding of sexual health, and recognizes the importance of reducing risky sexual behavior while at the same time promoting positive sexuality and healthy sexual relationships. Adolescence and young adulthood are normative times when young people are beginning to be sexually active and developing ways of being in sexual and romantically involved relationships. By understanding the social and cognitive processes that influence sexual behavior choices during adolescence and young adulthood, we will be better able to promote positive sexual health and reduce risky sexual behavior and its negative consequences.

In addition to a more positive focus on sexual health, this dissertation seeks to understand patterns of sexual behavior *over time*, during the adolescent and young adult time period. Much of the existing research looks at single point-in-time measures of specific sexual behaviors. For example, a cross-sectional study measuring the relationship between condom use and STI and unintended pregnancy. Understanding the typical patterns of sexual behavior over time could provide a more holistic picture of sexual behavior among young people. Also,

because sexuality and sexual health are integrally related to other parts of health and development, this dissertation seeks to understand how general social and cognitive development processes during childhood and adolescence influence sexual behavior, and how patterns of sexual behavior are associated with a range of social and health outcomes during young adulthood. For example, do some patterns of sexual behavior lead to more positive perceived health or more positive mental health?

Understanding patterns of adolescent and young adult sexual behavior over time and the predictors of those patterns is important because it has implications for healthy sexuality in adulthood (Tolman & McClelland, 2011) as well as unintended pregnancy and sexually transmitted infections (STI). Data from the Youth Risk Behavior Survey show that early sexual initiation is relatively common; in 2013, 30.0% of 9th graders (age 14-15 years) reported ever having had sex, while early sexual ignition is less normative(5.6% of students reported initiating sex before age 13; 3.1% of girls and 8.3% of boys)(Centers for Disease Control and Prevention, 2014). Some youth engage in risky sexual activity: 15.0% of high school students reported sex with 4 or more persons during their life (13.2% female, 16.8% male), and 22.4% of sexually active high school students (19.3% of females and 25.9% of males) reported drinking alcohol or using drugs before last sexual intercourse (Centers for Disease Control and Prevention, 2014). Further, a significant proportion of young people do not use condoms; in 2013 40.9% of sexually active high school students reported that they did not use a condom at their last sexual encounter—46.9% of females, and 34.2% of males. Some studies have shown that early sexual initiation is associated with continued risky sexual behaviors such as having multiple partners, having sex while drunk or high, and incorrect and inconsistent condom use (O'Donnell, O'Donnell, & Stueve, 2001).

Risky sexual behaviors put young people disproportionately at risk for sexually transmitted infections (STI). Estimates suggest that even though young people ages 15 to 24 years represent only 25% of the sexually experienced population, they acquire nearly half of all new STIs (Satterwhite et al., 2013). For HIV, the rates are more in keeping with their proportion of the population; however adolescents are less likely to get tested for HIV than adults (Centers for Disease Control and Prevention, 2011, 2012). Further, risky sexual behavior puts youth at risk for unintended pregnancy. There were 31.3 births per 1,000 teenagers aged 15–19 in 2011, which represents an 8% decrease from the previous year (Hamilton, Martin, & Ventura, 2012). However, even with this decline, women ages 18 to 24 still have the highest rate of unintended pregnancy of all age groups (Finer & Zolna, 2014).

While all adolescents and young adults are at increased risk for STIs and unintended pregnancy, there are sub-groups of young people at even greater risk. Youth living in high poverty neighborhoods are more likely to initiate sex early, and are more likely to report ever having had an STI than young people who live in higher SES neighborhoods (Adimora & Schoenbach, 2005; Cubbin, Santelli, Brindis, & Braveman, 2005). Disparities also exist across racial/ethnic lines; rates of the most common STIs are between 5 and 20 times higher among African American adolescents than their white counterparts (Harris, Gordon-Larsen, Chantala, & Udry, 2006). LGBTQ young people are also at increased risk for risky sexual behavior as well as STI—and African American LGBTQ young people are at even greater risk (Mojola & Everett, 2012).

While sexual behavior carries with it risks for negative consequences such as unintended pregnancy and STIs, it is also a part of the healthy development of adolescents moving into young adulthood. Research has been done to understand the association between single ‘risky’

sexual behaviors and outcomes such as unintended pregnancy and STI (Diamond & Savin-Williams, 2009); however less has been done to look at the larger context of a young person's sexual behavior. Haydon and colleagues have looked at patterns of sexual initiation (Haydon, Herring, Prinstein, & Halpern, 2012) and the association with young adult reproductive health outcomes, and found that early patterns of risky sexual behavior may not predict later STI diagnosis and risky sexual behavior (Haydon, Herring, Halpern, & Carolyn, 2012). Other studies have examined the trajectory of sexual risk behavior using composite measures (Fergus, Zimmerman, & Caldwell, 2007; Huang, Murphy, & Hser, 2012), or using a mean level of sexual risk behavior over time (Capaldi, Stoolmiller, Clark, & Owen, 2002). However, no studies have examined several risky sexual behaviors simultaneously to examine the complex pattern of sexual behaviors as young people develop from adolescents to young adults. In addition, previous research has shown that there are differences in sexual behavior and rates of STI by gender and race/ethnicity, so examining whether the pattern of sexual behaviors over time differ by sub-group is important (Fergus et al., 2007; Mojola & Everett, 2012).

This dissertation draws upon the social development model (SDM) as a theoretical tool to organize the literature on risk and protection. The SDM integrates elements of social control theory (Hirschi, 1969), social learning theory (Akers, 1977), and differential association theory (Sutherland, 1973) to explain the development of positive and negative behaviors over time (Catalano & Hawkins, 1996). The SDM posits that if young people are provided with positive opportunities and experiences in multiple contexts of their lives (e.g., school, family); develop their social, emotional and cognitive skills; and are recognized for positive actions they will be more likely to bond to those with whom they are involved and interacting. If the individuals they engage with over time and bond with are prosocial, they will tend to adopt their healthy

beliefs and clear standards, do well in school, choose healthy behaviors, and tend to have more positive mental and physical health outcomes throughout their lifespan (Catalano & Hawkins, 1996). In this study, healthy behavior includes not initiating sex before age 15 and a less-risky pattern of sexual behavior during young adulthood. The social development mechanisms explicated by the SDM are expected to mediate the impact of structural determinants of health, such as SES as well as race and gender on risky sexual behavior (Hill et al., 2014).

This dissertation will examine three important sets of questions about sexual behavior across adolescence and young adulthood. First, it will explore the etiology of theory-based social and cognitive risk and protective factors (Buhi & Goodson, 2007; Catalano & Hawkins, 1996; Kirby & Lepore, 2007; Markus & Nurius, 1986), predicting age of sexual initiation. As organized by the SDM, the proposed model of the mechanisms through which risk and protective factors affect risky sexual behavior includes parental supervision, a measure of external constraints; position in the social structure (e.g., gender, race/ethnicity, SES); and individual constitutional factors such as age of pubertal onset that influence the family and school environments. Skills for interaction also impact the school and family environments, which in turn predict belief in prosocial norms and healthy beliefs and clear standards. From the theory of possible selves, belief in the future is expected to be predicted by belief in prosocial norms and healthy beliefs and clear standards, and in turn, predicts age of sexual initiation.

Given the potentially life-changing consequences of risky sexual behavior, including STI, HIV, and unintended pregnancy, it is important to deepen our understanding of the individual-level motivations, beliefs, and attitudes, as well as the larger contextual factors (e.g., characteristics of the family, school and peer group), that influence adolescent and young adult sexual behavior. By better understanding how these theoretically identified social development

factors (e.g., bonding and involvement with pro-social others in the family, school, or peer group; belief in a positive future for themselves) interact with one another to influence later sexual behavior decisions, and when in development they are most salient, we may be able to improve our ability to promote healthy sexual decisions and behavior among young people and prevent unintended pregnancies and STIs. While the field has made great strides in understanding the more immediate sex-specific risk and protective factors that predict risky sexual behavior (including attitudes toward sex and condom use or self-efficacy to negotiate condom use), much more can be done to understand how developmental contexts during childhood and adolescence influence sexual behavior. For example, do family factors such as parental supervision influence which peer group a young person is part of; do they modify how school factors such as school involvement influence sexual behavior? Paper 1 uses structural equation modeling to examine whether the socialization processes described by the SDM influence the decision of when to first have sexual intercourse, and whether the data fit the model defined by the theory. The paper investigates the temporal relations among family and school environments whether these developmental contexts influence bonding to school and family; and whether the bonding at these two ecological levels affects perceived norms, health beliefs, and beliefs in the future at later time points, and in turn whether these norms and beliefs predict sexual initiation.

Second, the developmental pattern of sexual behavior itself is little understood. Sexual behavior is a healthy part of development, unlike problem behaviors such as substance use or violence, where non-involvement may be the public health goal. Research on adolescent and young adult sexual health has primarily focused on individual risky sexual behaviors, but we need to understand patterns of sexual behavior over a young person's development so that we

can better assess the risk associated with each pattern. For example, early sexual initiation has been found to be associated with later negative sexual health behaviors and outcomes (Capaldi et al., 2002; O'Donnell et al., 2001; Pflieger, Cook, Niccolai, & Connell, 2013). However, are there some individuals who initiate sexual intercourse at a younger age, but then practice consistently safer sexual behaviors over time, or does early sexual initiation always put young people on a trajectory of risky sexual behavior that continues throughout adolescence and young adulthood? By studying the sexual behavior of young people over time we may be able to discover what predicts different patterns of sexual behavior, and which patterns are associated with increased risk of STI and unintended pregnancy. Also, identifying the patterns will allow us to understand factors that may moderate or mediate the risk associated with these patterns. Paper 2 begins to answer these questions by conducting a latent class analysis to assess whether there are patterns of sexual behavior from age 19 to age 23 that can be identified among a prospective panel of 1,040 young people who participated in Raising Healthy Children, a longitudinal study that included a test of a social development intervention. This paper also addresses whether constructs of socialization identified by the social development model predict membership in the five sexual behavior patterns, and examines whether there are differences by gender.

The third set of questions taken up in this dissertation concerns the association between the identified patterns or classes of sexual behavior from the second paper and health and social outcomes during young adulthood. Paper 3 uses the same latent sexual behavior classes identified in paper 2 to predict physical, mental, and social health outcomes at age 24, and to assess whether there are differences by gender. Social outcomes to be examined include marital status, ever having been pregnant/gotten someone pregnant, having 1 or more children, current

employment, and having received public assistance at age 24. Three measures of perceived health will be included—a measure of overall perceived health, perceived mental health, and perceived physical health. Other health outcomes to be examined include ever having had an STI, depression, alcohol abuse or dependence, and drug abuse or dependence.

This dissertation contributes to the social welfare knowledge base through deepening our understanding of the patterns of sexual behavior across adolescence and young adulthood, the underlying mechanisms that influence the sexual behavior of adolescents and young adults, and the mental, physical, and emotional health consequences of different patterns of sexual behavior. Further, this study will help us understand similarities and differences by gender in typical patterns of sexual behavior, the social and cognitive predictors of those patterns, and how the patterns of sexual behavior may differentially predict social and health outcomes. Illuminating these similarities and differences by gender will help explain why health disparities by gender may exist, and how these predictors may be addressed to improve sexual health and sexual health equity. This dissertation intends to build our understanding of the mechanisms behind the noted gender disparities in STI (Mojola & Everett, 2012) by looking earlier in childhood and adolescence at family and school factors that may differentially impact adolescents' sexual behavior choices.

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## **PAPER 1: PREDICTING AGE OF SEXUAL INITIATION: TEST OF A SOCIAL DEVELOPMENT CONCEPTUAL MODEL**

### **Introduction**

Young people in the United States are disproportionately impacted by sexually transmitted infections (STIs). Of the 19.7 million incident STIs in 2008, almost half (9.8 million) were among young people ages 15 to 24 (Satterwhite et al., 2013). Early sexual initiation is a risk factor for further risky sexual behavior, and is associated with greater likelihood of STI (Kirby & Lepore, 2007; Upchurch, Mason, Kusunoki, & Kriechbaum, 2004). In 2013, 5.6% of high school students in the United States reported that they had sex for the first time before age 13 (Centers for Disease Control and Prevention, 2014). Fifteen percent of high school students reported they had 4 or more sexual partners in their lifetime, and 59% of sexually active high school students said they used a condom the last time they had sex—which represents a significant decline from a high of 63% in 2003 (Centers for Disease Control and Prevention, 2014). Given the continued high rates of STI among young people and relatively high rates of risky sexual behavior, etiological and intervention research are still needed to improve the effectiveness of interventions to prevent STI (Centers for Disease Control and Prevention, 2013).

Previous research has identified predictors of sexual behavior among adolescents from the individual, family, peer, school, and community levels—both predictors that increase the likelihood of risky sexual behavior (risk factors, such as peer substance use norms or high family conflict) and predictors that reduce the likelihood of risky sex (protective factors, for example good parent-child communication or belief in a positive future) (Kirby & Lepore, 2007). Given the large numbers of predictors of sexual behavior from multiple domains of influence, a theoretical framework is needed to organize them and help us understand how the

factors interact with one another to predict sexual behavior. Several frameworks, including ecological and behavioral models, have been applied to predicting early and risky sexual behavior.

Several studies have used an ecological or multisystemic perspective (for example, see Buhi & Goodson, 2007; Kotchick, Shaffer, Forehand, & Miller, 2001; Resnick et al., 1997; Small & Luster, 1994). One widely-used model is Bronfenbrenner's bio-social-ecological theory, which encapsulates the idea that children are born with certain genes and biologically-based traits, but then grow and develop within the nested contexts of family, school, community, and society (U. Bronfenbrenner, 1977; U. Bronfenbrenner, 2001). The chronosystem described by Bronfenbrenner indicates that there are patterns and transitions over time. Also important to consider is the mesosystem, which suggests that the contexts within which a person lives interact with one another, meaning for example the family environment is influenced by the school environment and vice versa. Thus, according to this framework, models of sexual behavior should include individual characteristics and consider influences from a range of social domains, including family, peers, neighborhood, and larger society, as well as consider how factors from different domains might influence each other and how they might change across development.

Along with a strong base in ecological frameworks, research in this area has also employed behavioral theories to predict risky sexual behavior. For example, Jessor and colleagues found that psychosocial protective factors identified by problem behavior theory (Jessor & Jessor, 1977), such as high regulatory controls and friends modeling conventional behavior, were inversely related to early sexual initiation (Jessor, van den Bos, Vanderryn, Costa, & Turbin, 1995). Another study tested a mediational model informed by problem

behavior theory (Schofield, Bierman, Heinrichs, Nix, & Conduct Problems Prevention Research Group, 2008), following participants from ages 6 to 13. The study found that the impact of early childhood aggressive-disruptive behavior on early adolescent sexual behavior was partially mediated by early school maladjustment and substance use, and early attention problems impacted early sexual behavior through early school maladjustment only. Thus, models of sexual behavior also should consider the role of peer modeling of behavior and school adjustment.

Another behavioral theory, the theory of planned behavior (Ajzen, 1991), has been tested to see if it predicts sexual behavior. Beadnell and colleagues found that the theory of planned behavior predicted the intention to have sex and the probability of having sex among high school age adolescents (Beadnell et al., 2007). The same study also tested two additional models, adding intrapersonal and interpersonal distal variables whose effects were hypothesized to be mediated by norms, attitudes, and self-efficacy. When intrapersonal variables such as sensation seeking and alcohol use were added to the model the fit remained strong and the effects of the intrapersonal variables were mediated as expected by norms, attitudes and self-efficacy. However, when interpersonal variables such as parent communication and pressure to have sex were included they found that the variables had direct effects on sexual intentions and sexual behaviors that were not mediated by theory of planned behavior constructs (Beadnell et al., 2007). This suggests that while the individual-level factors described by the theory of planned behavior are important in predicting sexual behavior, social influences including the school and family are important additions to the model.

From these tests of theory, we find that models predicting adolescent sexual behavior should address multiple domains of influence, and should examine how these domains interact

and how their influence on behavior changes across development. In addition, an individual's beliefs and attitudes are key influences on their sexual behavior, but these studies showed that the norms and behaviors of peers, and social influences at the school and family levels also predicted risky sexual behavior. In the current study, we incorporated the lessons from these tests of theory into a conceptual model predicting age of sexual initiation.

For this study, we draw from the social development model (SDM), which describes general developmental processes that lead to either prosocial or problem behavior (Catalano & Hawkins, 1996), and add elements of the theory of possible selves (Markus & Nurius, 1986). An advantage of the SDM is that it integrates elements of the ecological and problem behavior frameworks, and is flexible enough to allow inclusion of additional constructs drawn from the theory of possible selves. The SDM posits two paths, a prosocial pathway and a problem pathway. This study explicitly focuses on the prosocial pathway, proposing that if young people are provided with positive opportunities and experiences in multiple contexts of their lives (e.g., school, family), develop their social, emotional and cognitive skills to be actively involved, and are recognized for positive actions they will be more likely to bond to those with whom they are involved and interacting. If the individuals they engage with over time and bond with are prosocial, they will tend to adopt healthy beliefs and clear standards, do well in school, choose healthy behaviors, and tend to have more positive mental and physical health outcomes throughout their lifespan (Catalano & Hawkins, 1996).

In addition, the SDM posits that one's position in the social structure (gender, race/ethnicity), individual factors (pubertal timing, impulsivity), and external constraints (laws, rules, norms) also impact, either positively or negatively, these social development processes. The theory is developmental, and outlines how the distinct social environments that influence

behavior change across development (Catalano & Hawkins, 1996). While the SDM was originally conceptualized to understand the development of problem behaviors such as substance use and delinquency, previous studies suggest that the social influences described by the SDM also predict sexual behaviors and risk for STI (Hill et al., 2013; Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002).

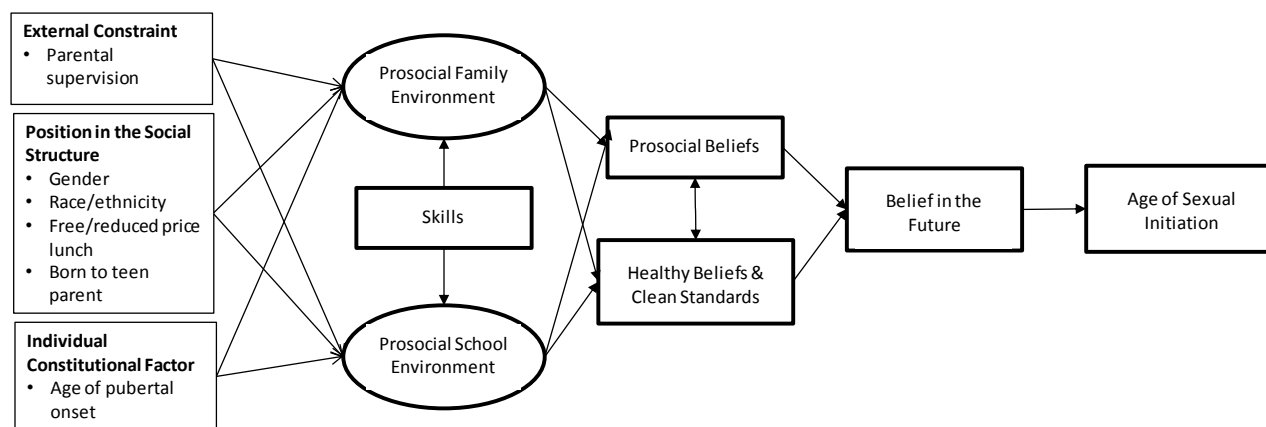


Figure 1.1. Proposed model

This study tests whether a model integrating the SDM and the theory of possible selves (see Figure 1.1) fits the data and predicts a later age of sexual initiation. The model hypothesizes that parental supervision (external constraints); gender, race/ethnicity, and childhood poverty (position in the social structure); and age of pubertal onset (individual factors) influence the family and school environments (opportunities, involvement, and recognition) experienced by youth. A young person's skills for interacting with others are also hypothesized to influence the rewards young people receive for their involvement in the family or school. The degree to which the family and school environments experienced are prosocial impacts whether youth develop strong beliefs in prosocial norms (related to helping behaviors)

and healthy beliefs and clear standards (related to honesty and doing what is right) that are health-reinforcing. In turn, beliefs in prosocial norms and healthy beliefs and clear standards are expected to enhance a young person's belief in a positive future for him or herself, which in turn is thought to lead to delayed initiation of sex. Belief in the future, which can be expressed as future orientation or expectations for one's future self, was added to the model from the theory of possible selves (Markus & Nurius, 1986). Previous research has indicated that psychological variables such as belief in the future are associated with delayed sexual initiation and less risky sexual behavior (Gloppen, David-Ferdon, & Bates, 2010; Rothspan & Read, 1996). The theory of possible selves suggests that having a strong vision for what young people want to become in the future (as well as a vision of what they do not want to become) motivates young people to take steps towards that desired future. Thus, a strong positive future belief should reduce the likelihood of behaviors such as early sexual initiation that might put their positive possible self at risk.

This test of a model integrating the SDM and the theory of possible selves examines for the first time its ability to predict age of sexual initiation across development. This study addresses two research questions:

1. Do the data support the proposed model to predict age of sexual initiation (See Figure 1.1)?
2. Are these findings similar or different by gender?

## **Methods**

### **Sample**

Data were drawn from two cohorts of participants who were recruited into the Raising Healthy Children (RHC) study from 10 public elementary schools in a suburban school district in the Pacific Northwest. Participants were in first (younger cohort) or second (older cohort) grade in the fall of 1993 and 1994 and came from a socioeconomically diverse population that

was 75.3% White, 6.7% Asian or Pacific Islander, and 18.0% other (Native American, African American, or mixed race); 8.6% were Hispanic. All eligible families of first- and second-grade students from these schools were recruited into the longitudinal study. To be eligible, students had to remain in their school throughout the entire 1st year of their participation in the study and have a parent who spoke English, Spanish, Korean, or Vietnamese. In Year 1, 938 of the eligible 1,239 students provided written parental consent to participate in the study. In Year 2, the sample was augmented with an additional 102 students from a second eligible pool of 131 students who had newly entered the project schools during second grade, yielding a total sample of 1,040 students. The sample was 53% male and the mean age of students at the beginning of the study was 7.43 years ( $SD = 0.62$ ), selected from both first- (52%) and second-grade (48%) classrooms. Twenty-nine percent were from low-income households, indicated by the student having received free/reduced-price lunch programs during the fourth and fifth grades (see Table 1.1). Completion rates for student surveys were greater than 89% from Grade 4 through Grade 12. Attrition was not related to gender, ethnicity, or low-income status (i.e., whether they received free/reduced-price school lunch in the first 2 years of the project).

Table 1.1. Descriptive information

	N (%)
Gender	
Female	492 (47%)
Male	548 (53%)
Race/ethnicity	
White	780 (75%)
Asian/Pacific Islander	73 (7%)
Other, Mixed race/ethnicity	187 (18%)
Born to a Teen Mom	96 (9%)
Received free/reduced-price lunch*	395 (38%)
Age of pubertal onset	12.76 yrs ( $SD=1.45$ )
Age of sexual initiation	15.60 yrs ( $SD=5.72$ )
Intervention condition	
Intervention	478 (46%)
Control	562 (54%)

\*As reported in Grades 4 - 5.

The 10 schools selected to be part of the study had student populations with the highest aggregate measures of risk as defined by low SES and poor attendance patterns. Schools were then matched on risk factors including low-income status, ethnicity, single-parent families, low reading scores, high absenteeism, and mobility. One school from each matched pair was assigned randomly to either an intervention or control condition. Information on the RHC intervention has been reported previously (for more information, see Catalano et al., 2003).

### Procedure

The study was approved by the University of Washington Institutional Review Board. Parents gave active written consent for themselves and their child at the start of the study, and children gave active written assent each year. This study used data collected from students in Grades 4 – 12. Student data collection in Grades 4 through 8 consisted of group administration in students' schools during regular school hours. In Grades 9 through 12, data were collected using computer-assisted personal interviewing (CAPI). For sensitive questions, such as those related to sexual activity, the computer was turned over to the respondent for self-administration. Data from the two cohorts were combined.

### Measures

Position in the social structure was assessed by 4 items. Participants self-reported their *gender* and *race/ethnicity*. Parents reported whether the child *received free or reduced price lunch* during 4<sup>th</sup> or 5<sup>th</sup> grade. A variable indicating whether the child was born to a *teen mom* was created by comparing the child and mother's ages. *Parental supervision* was included as an external constraint, and was measured by a 7-item scale in grades 4-6 that asked about the extent to which the participant perceived their parents to know their whereabouts and activities.

One individual characteristic was included in the model. *Age of pubertal onset* was obtained by asking females when they first menstruated, and males were asked when they first experienced signs of puberty such as developing facial or pubic hair or cracking/lowering of their voice.

Socialization experiences in the family and in school during grades 4 through 6 were measured by two latent constructs, each with multiple indicators. *Prosocial family environment* was defined by three indicators: *prosocial involvement in family*, a 5-item scale asking about activities participants did with parents, and whether or not participants talked with their parents and whether parents listen; *rewards for family involvement* was measured by a 3-item scale asking whether participants were noticed for positive things they've done; and *family bonding* was measured by an 8-item scale including questions asking about closeness of participants to their parents, and whether they shared their thoughts, feelings, and problems with their parents. *Prosocial school environment* was defined by three parallel indicators: *prosocial involvement in school* was measured by a 3-item scale asking whether the teacher or other students provided help when it is needed, and whether everyone had a chance to talk; *rewards for school involvement* was measured by a 5-item scale asking whether the participant felt successful at school and if teachers let them know when they did something well; and *school bonding* was measured by a 3-item scale asking if participants liked school and tried hard to do well.

One set of items measured respondents' skills for interaction. *Skills for prosocial involvement* was measured by an 8-item scale in grades 4-6, including questions about problem-solving skills and their ability to make friends.

Several measures of beliefs were included. *Beliefs in prosocial norms* and *healthy beliefs and clear standards* were measured during grades 7-8. *Beliefs in prosocial norms* was measured

by 2 items asking whether participants feel they should help others when they are in need.

*Healthy beliefs and clear standards* was measured by 4 items, including questions about the importance of being honest and fair. *Belief in the future* was measured by a 5-item scale in grades 9 - 10 that asked participants about their thoughts and plans for education, career, and family after high school.

The final outcome, *age of sexual initiation*, was created from dichotomous questions asked annually beginning in grade 8. In Grades 8 and 9 participants were asked “have you ever had sexual intercourse”, and in Grades 10 - 12 and post high school, participants were asked if they had sex in the past year. These variables were used to create a variable indexing age at sexual initiation (range 14 to 24 years). For participants who had not reported having sex by age 24, for the purposes of this study age at first sex was set at 25. See Table 1.2 for additional information about the measured scales included in the study.

Table 1.2. Measurement scales

Scales	Number of items ( $\alpha$ range for all time points)	Sample item
Family (Gr. 4-6)		
Parental supervision	7 (0.72-0.82)	Do your parents know what you do with your friends?
Family bonding	8 (0.82-0.86)	Are you close to your mom or the person who acts as your mom?
Family involvement	5 (0.69-0.72)	When you ask your mom or dad questions, do they usually listen?
Rewards for family involvement	3 (0.71-0.78)	Does your mom or dad notice when you've helped out at home?
School (gr. 4-6)		
School bonding	3 (0.52-0.55)	Do you like your teachers?
School involvement	3 (0.58-0.63)	Do all students in your classes get a chance to talk and share?
Rewards for school involvement	5 (0.68-0.70)	Does your teacher let your parents know when you've done well?
Individual		
Skills (Gr. 4-6)	8 (0.77-0.79)	When I have a problem, I think about what would happen before I decide what to do.
Belief in prosocial norms (Gr. 7-8)	2 (0.73 – 0.77)	Do you think you should help another kid when s/he needs help?
Healthy beliefs & clear standards (Gr. 7-8)	4 (0.72-0.74)	It is important to be honest with your parents, even if they become upset or you get punished.
Belief in the future (Gr. 9-10)	5 (0.63-0.65)	Eventually, how much schooling do you expect to get?

## Analysis

A combination of latent and measured variables was used in the analyses. Variables were created at different developmental time points to allow for time-ordering among the constructs of the integrated model predicting age of sexual initiation. All analyses were conducted using Mplus version 7 (Muthén & Muthén, n.d.). Missingness on the observed variables in this study ranged from 3 to 14%. Data were imputed using the data imputation option in Mplus. Twenty data sets were imputed. Models were tested in each dataset, and results were averaged across the 20 data sets. Data were analyzed using the MLMV estimator option in

Mplus, a mean- and variance- adjusted maximum likelihood estimator that can handle non-normally distributed data.

The analyses were conducted in two phases. First we estimated the fit for the measurement model for *prosocial family environment* and *prosocial school environment*. Once a baseline model was fit for each latent construct, we tested for configural, metric, and scalar invariance across gender and intervention status groups. In addition we tested whether the latent means were equivalent across groups, and found that the measurement models for *prosocial family environment* and *prosocial school environment* were equivalent across genders and across intervention status, indicating that the indicators were operating similarly across the groups. Because of the group invariance, in the next phase we pooled all of the data, controlling for possible effects of intervention status on each of the structural paths, and modeling gender as an exogenous variable.

In the second phase we tested the proposed theoretical model hypothesized by the SDM predicting age of sexual initiation. Based on absolute and incremental fit indices, the a priori model fit was fairly poor. However, based on the modification indices, several additional paths were added to the model that made substantive and statistical sense. We assessed model fit by looking at absolute fit criteria including the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR); as well as incremental fit criteria including the comparative fit index (CFI), and the Tucker-Lewis Index (TLI) (Byrne, 2012).

## **Results**

### **Descriptive Results**

The mean age of pubertal onset was 12.76 (SD=1.45), which is in line with national averages (Sun et al., 2005). The mean age of sexual initiation in this sample was 15.6 years

(SD=5.7). There was not a significant difference in the age of sexual initiation by intervention status. Table 1.3 shows the means and standard deviations for all of the measured scales included in the study. All scales have four response options, ranging from 1 (NO!) to 4 (YES!), so a higher score on each scale means a higher level of that construct.

Table 1.3. Mean scores on measured scales

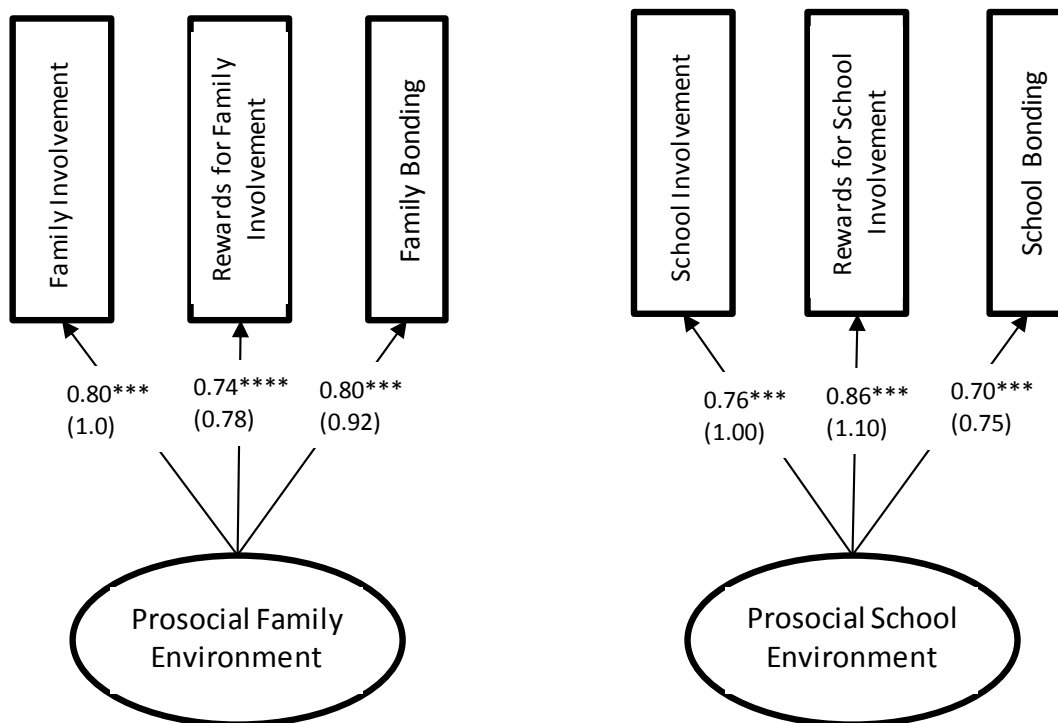
Scales	Mean (SD)
Parental supervision (gr. 4-6)	3.56 (.38)
Family bonding (gr. 4-6)	3.17 (.52)
Family involvement (gr. 4-6)	2.79 (.57)
Rewards for family involvement (gr. 4-6)	3.53 (.48)
School bonding (gr. 4-6)	3.44 (.39)
School involvement (gr. 4-6)	3.15 (.47)
Rewards for school involvement (gr. 4-6)	3.06 (.46)
Skills (gr. 4-6)	3.02 (.46)
Belief in prosocial norms (gr. 7-8)	3.45 (.47)
Healthy beliefs & clear standards (gr. 7-8)	3.21 (.54)
Belief in the future (gr. 9-10)	2.35 (.37)

Note: Scale scores range from 1 to 4

## Measurement Model

Confirmatory factor analysis (CFA) was run on *prosocial family environment* and *prosocial school environment*, with three indicators each as described above. One indicator was fixed at 1 for each latent factor and the other 2 indicators were estimated freely. Figure 1.2 shows the standardized factor loadings with unstandardized loadings in parentheses. All of the factor loadings were significant and in the expected direction. The CFA model fit the data well with a chi square of 36.37 with 8 degrees of freedom ( $p < .001$ ; CFI=.99, TFI=.98, RMSEA =

0.06). As expected, the two latent constructs for *prosocial family environment* and *prosocial school environment* were significantly correlated ( $r=.68, p<.05$ ).



\*  $p<0.05$  \*\* $p<0.01$  \*\*\* $p<0.001$

Standardized regression coefficients with unstandardized (in parentheses)

Figure 1.2. Measurement model

### Structural Model

To examine the extent to which the proposed model (see Figure 1.1) fit the data, a structural equation model was estimated across 20 imputed data sets, and the estimates were averaged. The initial model fit was relatively poor, and several paths that made substantive sense were added to the model based on the modification indices. Direct paths between parental supervision and belief in prosocial norms, and between parental supervision and healthy beliefs and clear standards were added. Additionally, belief in the future did not significantly predict age of sexual initiation. Rather, the modification indices suggested that direct paths from

healthy beliefs and clear standards and age of pubertal onset predicting age of sexual initiation fit the data better. Gender was also a significant predictor of belief in prosocial norms and healthy beliefs and clear standards. Finally, correlations between the two latent constructs of prosocial family environment and prosocial school environment, and between belief in prosocial norms and healthy beliefs and clear standards were added. The final model fit was good. Because the analyses were run for each of the 20 imputed data set, here we provide the means and standard deviations for the fit indices: chi square with 100 degrees of freedom of 454.12 (SD= 17.45), CFI = .92 (SD=.00), TLI = .88 (SD=.01), and RMSEA = .06 (SD=.00).

Figure 1.3 provides the standardized path coefficients (with unstandardized coefficients in parentheses) for the final structural model. The external constraint variable, parental supervision, was positively associated with both a prosocial family environment ( $b=.52, p<.001$ ) and prosocial school environment ( $b=.24, p<.001$ ). Also, parental supervision during grades 4-6 predicted stronger healthy beliefs and clear standards during middle school ( $b=.14, p<.01$ ). Age of pubertal onset was not significantly associated with either the family or school environment constructs, but it was a significant predictor of the age of sexual initiation. A later age of pubertal onset was associated with a later age of sexual initiation ( $b=.26, p<.001$ ). Male gender was associated with a higher perceived prosocial family environment ( $b=.07, p<.01$ ). Asian-American participants (compared to white,  $b=.08, p<.01$ ) and those who received free or reduced priced lunch ( $b=.06, p<.05$ ) were likely to report a more prosocial school environment. As hypothesized by the SDM, skills for interaction were significantly associated with both prosocial family environment ( $b=.37, p<.001$ ) and prosocial school environment ( $b=.58, p<.001$ ). In turn, prosocial family environment and prosocial school environment during elementary school each predicted stronger healthy beliefs and clear standards during middle

school ( $b=.23$  and  $.19$  respectively,  $p<.001$ ). Prosocial school environment during grades 4-6 predicted more beliefs in prosocial norms ( $b=.11$ ,  $p<.05$ ), but prosocial family environment did not. Males were likely to report lower beliefs in prosocial norms ( $b= -.21$ ,  $p<.001$ ) and lower healthy beliefs and clear standards ( $b= -.19$ ,  $p<.001$ ). Belief in prosocial norms and healthy beliefs and clear standards during middle school (grades 7-8) both predicted higher levels of belief in the future during grades 9 and 10 ( $b=.09$  and  $.22$  respectively,  $p<.01$ ). Belief in the future did not uniquely predict age of sexual initiation ( $b= -.01$ ), but having stronger healthy beliefs and clear standards during middle school did predict a later age of sexual initiation ( $b=.23$ ,  $p<.001$ ).

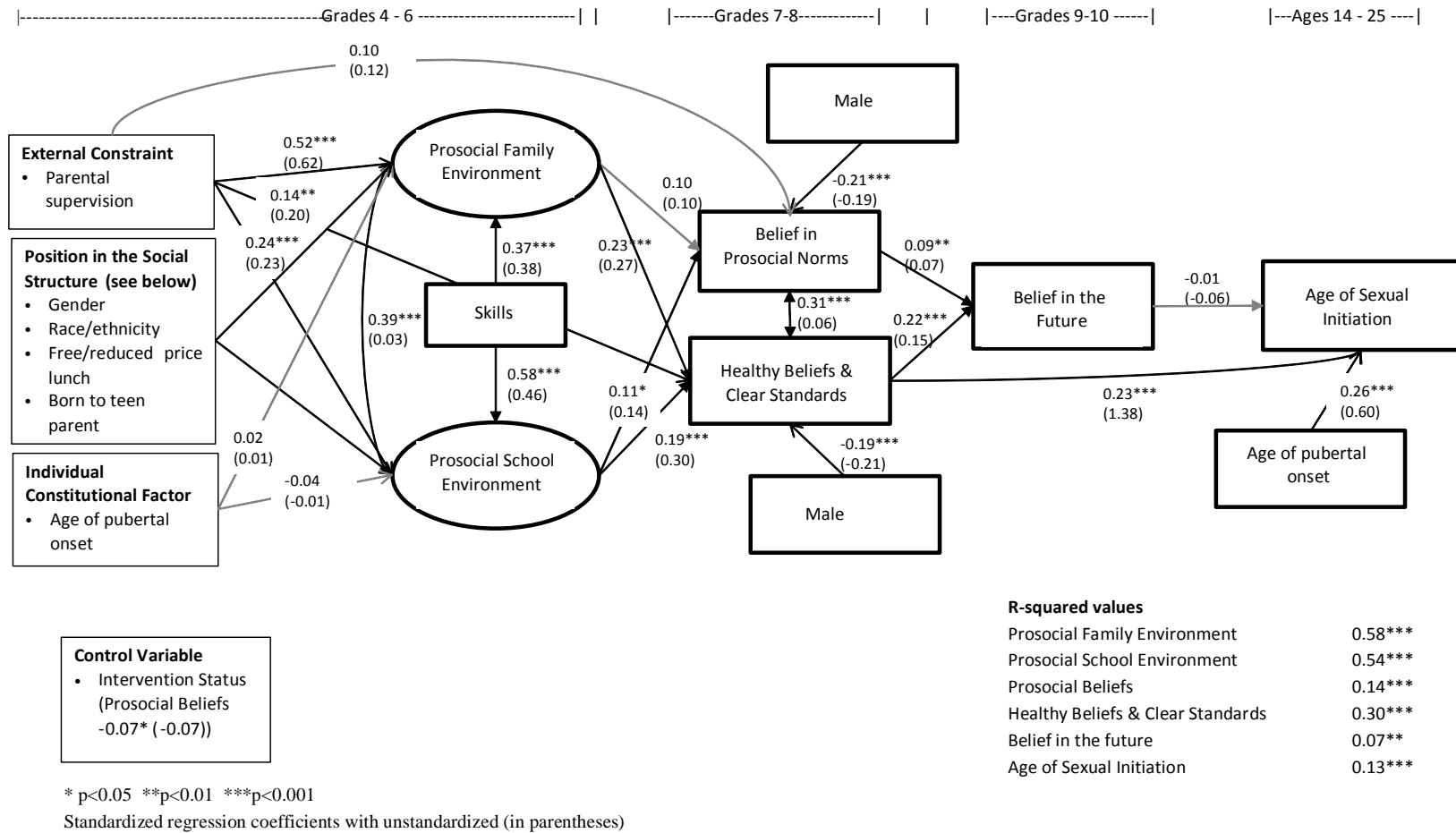


Figure 1.3. Structural equation model

## **Discussion**

The final model supported many of the pathways of the SDM overall and predicted 13% of the variance in age of sexual initiation, which is a modest, but important, proportion of the variance. The inclusion of constructs from the theory of future selves (belief in the future), however, was not supported in these analyses. Undoubtedly, other factors more specific to sexual knowledge, attitudes, and skills also play a role in the timing of sexual initiation. Further, peer factors that are a part of the risk path of the SDM were not included in this test, and they are likely important influences as well. This study adds to the literature by testing whether a conceptual model drawn from the prosocial path of the social development model and the theory of possible selves predicted age of sexual initiation.

Findings suggest that these prosocial processes may be a key component in delaying sexual initiation and thus promoting healthy sexual behavior. Positive youth development interventions that target many of these prosocial developmental processes have been found to have a stronger and more sustained impact on sexual risk behavior than programs that focused only on sexual risk reduction (Gavin, Catalano, David-Ferdon, Gloppen, & Markham, 2010). These types of interventions are an important contributor to reduced STI among young people, especially those that have been implemented at a younger age. However although interventions promoting positive youth development can provide the motivation young people need to make healthier choices, effective sex education programs and easily accessible and youth-friendly sexual and reproductive health services remain critical to ensure young people have the knowledge, attitudes, skills, and resources they need to prevent early age of sexual initiation, prevent STI and unintended pregnancy, and develop a healthy sexuality (Kirby, 2007).

The current findings also add information about the role of gender in sexual initiation. The study found measurement equivalence across males and females in measures of family and school socialization, indicating that these measures operated similarly for males and females. Importantly, males reported higher levels of prosocial family environment. Future research aimed at understanding why that might be is needed. During the model building phase, we found that including direct paths from gender to belief in prosocial norms and healthy beliefs and clear standards significantly improved the model fit. While the social processes seem to work similarly across genders, males were less likely to report strong beliefs in prosocial norms and healthy beliefs and clear standards. Thus although males reported higher levels of prosocial family environment, this did not translate into more prosocial norms and healthy beliefs. This might suggest that peer norms and expectations may play a bigger role in developing young men's own personal beliefs and standards, so males in particular could benefit from interventions promoting prosocial peer norms.

Two additional paths were added to the structural model to improve fit. Parental supervision during elementary school had a significant direct effect on stronger beliefs in prosocial norms and healthy beliefs and clear standards in middle school. Parental supervision was also significantly associated with a positive family and school environment. This suggests that parental supervision had an effect on prosocial beliefs and standards above and beyond its effect through the family and school environment. This finding is especially interesting in light of the finding discussed above that a prosocial family environment does not necessarily lead to healthy beliefs and clear standards among boys. It may be that parental supervision makes it less likely that young people are associating with peers who are engaged in negative behaviors, thus leading to healthier beliefs and more prosocial norms. Several studies have shown that parents

are major influences on the sexual behavior of children and adolescents (Buhi & Goodson, 2007; Markham et al., 2010). The current study shows that early parental supervision can influence the social processes that are related to sexual initiation, providing support for prevention programs that work to improve parenting skills such as monitoring and communication.

Findings from this study also support previous research that the age of pubertal onset is associated with the age of sexual initiation (Deardorff, Gonzales, Christopher, Roosa, & Millsap, 2005; Flannery, Rowe, & Gulley, 1993). This finding highlights the importance of taking the physical and social development of young people into consideration when planning preventive interventions. For example, programs designed to delay sexual initiation may need to be implemented before puberty.

In this study, belief in future during 9<sup>th</sup> and 10<sup>th</sup> grade was not a significant predictor of age of sexual initiation. Previous research has found belief in the future to be associated with delayed sexual initiation (Gloppen et al., 2010). It is possible that our measure of belief in the future was too close in time to sexual initiation; perhaps an earlier measure of belief in the future would better predict initiation. Alternatively, belief in the future may be more strongly associated with other less risky sex behaviors, such as consistent condom use. To test this possibility, I also ran the structural model predicting consistent condom use at age 19. These results showed that middle school beliefs in prosocial norms and healthy beliefs and clear standards both predicted higher belief in the future during high school, which in turn predicted more consistent condom use at age 19. Further research is needed to tease out the circumstances in which belief in the future is predictive of less-risky sexual behavior.

This study has several limitations. First, the sample was from a suburban school district in the Pacific Northwest, which may affect generalizability of the study results. Second the

sample, while 25% nonwhite, none of African American, Asian American, Native American, Latino or mixed race subsamples had sufficient numbers to allow detailed subgroup comparisons. Third, the measure of age of sexual initiation may have right and left censoring; some participants may have initiated sex before grade 8 when they were first asked, and approximately 100 participants had not reported having sex by age 24, the age of the most recent survey. Rather than excluding those participants who had not yet reported having sex we chose to cap their age of initiation at age 25, which restricts the range of ages of sexual initiation. This could add some bias in the results and reduce the likelihood of finding significant associations between sexual initiation and the prosocial developmental processes.

However despite these limitations, this study offers several contributions to the literature. The longitudinal nature of the data allowed us to model prosocial developmental processes over time, and to investigate whether earlier family and school environment factors influenced later individual beliefs. The findings showed that a prosocial family and school environment during elementary school did predict more prosocial beliefs during middle school, which in turn predicted a later age of sexual initiation. The study used structural equation modeling to test an a priori, integrated model of age of sexual initiation. The results showed that overall the data supported the positive developmental processes described by the SDM, providing some evidence that creating prosocial environments in young people's lives by providing opportunities to be involved in positive activities and rewarding them for their involvement and nurturing bonding with prosocial others, as well as enhancing their skills for positive interactions may lead to more prosocial beliefs and attitudes, which in turn may delay sexual initiation and reduced STI among young people.

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## **PAPER 2: PATTERNS OF SEXUAL BEHAVIOR DURING ADOLESCENCE AND YOUNG ADULTHOOD: SOCIAL DEVELOPMENT PREDICTORS**

### **Introduction**

Understanding the patterns of adolescent and young adult sexual behavior is important because they have implications for healthy sexuality in adulthood (Tolman & McClelland, 2011) as well as unintended pregnancy and sexually transmitted infections (STI). Although young people ages 15 to 24 years represent only 25% of the sexually experienced population, estimates suggest they acquire nearly half of all new STIs (Weinstock, Berman, & Cates, 2004). Additionally, national data from 2008 show that women age 18 to 24 had the highest rate of unintended pregnancy of all age groups (Finer & Zolna, 2014). While sexual behavior carries with it risks for negative consequences such as unintended pregnancy and STIs, it is also a part of the healthy development of adolescents and young adults moving into adulthood. Much research has been done to understand the predictors of single risky sexual behaviors during adolescence and young adulthood (Diamond & Savin-Williams, 2009), however less has been done to look at how prosocial developmental processes and other contextual factors relate to patterns of sexual behavior, including ‘healthier’ patterns of behavior.

Haydon and colleagues looked at patterns of sexual initiation (Haydon, Herring, Prinstein, & Halpern, 2012) and their association with young adult reproductive health outcomes, and found that early patterns of risky sexual behavior may not predict later STI diagnosis and risky sexual behavior (Haydon, Herring, Halpern, & Carolyn, 2012). Other studies have examined the trajectory of sexual risk behavior using composite measures (Fergus, Zimmerman, & Caldwell, 2007; Huang, Murphy, & Hser, 2012), or using a mean level of sexual risk behavior over time (Capaldi, Stoolmiller, Clark, & Owen, 2002). However, no studies have looked more holistically at the pattern of sexual behaviors over time during adolescence and young adulthood.

By teasing apart the specific behaviors that make up young adult sexual behavior patterns, and how those are differentially predicted by social developmental processes, we can better understand how to promote healthy sexuality and overall health during this developmental stage. Previous research has also shown that there are differences in sexual behavior by gender and race/ethnicity (Fergus et al., 2007; Mojola & Everett, 2012) so it is also important to examine differences in sexual behavior patterns by sub-group.

The social development model (SDM) integrates elements of social control theory (Hirschi, 1969), social learning theory (Akers, 1977), and differential association theory (Sutherland, 1973) to explain the development of positive and negative behaviors over time (Catalano & Hawkins, 1996). The SDM suggests that socialization includes three fundamental processes: opportunities, skills, and recognition in different social contexts (i.e., family, school, community, and peer). These opportunities, skills, and recognition are hypothesized to promote attachment and commitment, or bonding, to those socializing agents. Bonding to an individual or group is hypothesized to provide motivation to conform to the standards of behavior of that person or group, and in turn, lead to either prosocial or antisocial behavior, depending on the norms of that person or group. In this study, we are interested in the development of a less-risky pattern of sexual behavior during young adulthood. The SDM was originally conceptualized to describe the development of problem behaviors such as substance misuse and delinquency, however previous work has found that the social development processes described by the model also predict sexual behavior (K. G. Hill et al., 2014; Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002).

Previous research has shown the prosocial development constructs identified by the SDM are associated with less risky sexual behavior during adolescence (Buhi & Goodson, 2007;

Caminis, Henrich, Ruchkin, Schwab-Stone, & Martin, 2007; Gloppen, David-Ferdon, & Bates, 2010; House, Bates, Markham, & Lesesne, 2010; Markham et al., 2010). This study goes a step further to explore whether these childhood socialization processes predict adolescent and young adult sexual behavior over time. Since earlier sexual behaviors are highly predictive of later sexual behavior we also included measures of high school sexual behavior in our analyses.

This study used a person-centered approach to identify classes of sexual behavior over time. This type of approach allows us to see how different sexual behaviors interrelate in typical patterns. Then, the study assessed whether the social development processes described by the SDM (Catalano & Hawkins, 1996) predict the identified patterns or classes of sexual behavior. The results of the study could help us better understand sexual behavior in the context of a young person's overall development, and provide insight into ways to better promote healthy sexuality.

This study addressed the following research questions:

1. *Are there identifiable classes of individuals who follow similar patterns of sexual behavior from ages 19 to 23? What are these patterns?*
2. *What risk and protective factors predict membership in the classes of sexual behavior?*
3. *Does membership in these classes differ by gender?*

## **Methods**

### **Participants and Procedure**

This study used data from the Raising Healthy Children (RHC) study. Participants were recruited into the study in the fall of 1993 and 1994 when they were in 1st or 2nd grade at one of ten public elementary schools in a suburban school district in the Pacific Northwest. Ten of the 25 elementary schools in the district were selected on the basis of having student populations with the highest aggregate measures of risk as defined by low SES and poor attendance patterns.

Families of 1st- and 2nd-grade students from within these schools were recruited into the longitudinal study. To be eligible, students had to remain in their school throughout the entire first year of their participation in the study and have a parent who spoke English, Spanish, Korean, or Vietnamese. In Year 1, 938 of the eligible 1,239 students provided written parental consent to participate in the study. In Year 2, the sample was augmented with an additional 102 students from a second eligible pool of 131 students who newly entered the project schools during 2nd grade, yielding a total sample of 1,040 students. Schools in the study were matched on risk factors including low income status, ethnicity, single-parent families, low reading scores, high absenteeism, and mobility. One school from each matched pair was assigned randomly to either the intervention or control condition. Information on the RHC intervention has been reported previously (for more information, see Catalano et al., 2003).

The sample was 53% male, and was racially/ethnically diverse: 75.3% White, 6.7% Asian or Pacific Islander, and 18.0% other (Native American, African American, or mixed race); 8.6% were Hispanic. Twenty-nine percent of students were from low-income households, indicated by the student having received free/reduced price lunch during the 4th and 5th grades. Completion rates for student surveys were greater than 89% during high school (grades 10-12) and greater than 85% during ages 19 - 24. Attrition was not related to gender, ethnicity, or low-income status (i.e., whether they received free/reduced-price school lunch in the first 2 years of the project).

Students were interviewed annually from grades 1 or 2 through grade 12, twice per year in the two years following high school, and then again annually through age 24/25. The present study used participant self-report data organized by age, from ages 16 through 24. Parents gave active written consent for themselves and their child at the start of the study, and children gave

active written assent each year. At age 18 participants gave active consent to continue in the study. Student data in grades 10 through 12 were collected using computer-assisted personal interviewing (CAPI). For sensitive questions, such as those related to sexual activity, the computer was turned over to the respondent for self-administration. Post-high school waves of data were collected using a combination of CAPI and web-based survey administration. Previous analyses of these data showed there were no significant differences in response by mode of survey administration (McMorris, Petrie, Catalano, & Fleming, 2009). The study was approved by the University of Washington Institutional Review Board. Because these analyses looked at sexual behaviors, those respondents who reported never having sex by age 24 (63 males, 53 females) were excluded from the study.

## Measures

### *Indicators of Sexual Behavior*

To examine sexual behavior over time, the analysis used data collected when participants were 19, 20, 21, 22, and 23 years old (2005 - 2010). At each time point, participants reported whether they had engaged in casual sex in the past month, had multiple sexual partners in the past year, had concurrent sexual partners in the past year, used condoms inconsistently in the past month, or used alcohol or drugs prior to having sex in the past month. A dichotomous measure of *casual sex* was based on whether the respondents reported that they had sex with someone they did not “consider to be a boyfriend or girlfriend, that is [outside of] an exclusive relationship,” or had sex with a partner the respondent had known for less than 2 weeks. A dichotomous *multiple partners* variable was created based on whether the respondent reported sex with more than 3 partners in the past year. A measure of *concurrent sexual partners* (0 no, 1 yes) was created by combining responses to questions about whether the respondent or their

boyfriend/girlfriend had sex with another person during their relationship. An *alcohol/drug use prior to having sex* variable measured how often respondents reported drinking or using drugs before having sex (coded as 0 *never* or 1 *at least some of the time*). This variable was initially created as 2 variables measuring alcohol use before having sex and drug use prior to sex, however the variables were highly correlated and the prevalence of other drug use prior to sex was relatively low; combining the variables did not change the results. *Inconsistent condom use* was based on whether or not the respondent reported always using condoms for vaginal or anal sex. Figure 2.1 shows the percentages of males and females reporting each sexual behavior at ages 19 to 23.

Two measures of *sexual behavior during high school* were included. A mean level of *inconsistent condom use during high school* (grades 10 – 12) was created from an item that asked respondents how often they used condoms in the past year, ranging from never to always. The mean *number of sexual partners in the past year* was calculated for grades 10 – 12. If respondents reported seven or more sexual partners in one year they were classified as having 6. Also, a categorical variable *age of sexual debut* was created so that 0=never had sex, 1=initiated at age 14-15, 2=initiated age 16-18, and 3= initiated age 19 and above.

### *Predictors*

*Sociodemographic variables.* Self-reported *race* was represented by mutually exclusive dummy variables for Asian American and Other (African American, Native American, mixed race), with White as the reference category. Hispanic *ethnicity* (1=yes, 0=no) was self-reported. Participation in the National School Lunch and School Breakfast program was included as a measure of childhood *socioeconomic status* (1=participated, 0=did not participate). Whether the respondent was *born to a teenage mother* was coded as 1 if the mother was 19 years old or

younger at their birth or 0 if the mother was older than 19 years old. A measure of *college attendance* was created by combining self-reported measures of college attendance at each wave.

*Relationship status.* At each time point, respondents reported whether they were in a steady relationship with the partner(s) they reported having sex with (0 *no*, 1 *yes*).

*Social Development Constructs.* An average score across grades 9 through 12 was created for each social development construct. One measure of external constraints was included: *Parental supervision* was based on 7 items asking the extent to which parents were aware of respondents' activities, whereabouts, and friends they spend time with (Chronbach's alpha for grades 9 – 12 ranged from 0.72 – 0.77; cross-time reliability of the scale scores (stability coefficient) = 0.86). A measure of family bonding, *family conflict* was created from 4 items measuring how well family members get along and the nature of communication among family members (e.g., yelling, criticism) (alphas for grades 9-12 ranged from 0.63 - .71; stability coefficient = 0.79). *School bonding* included measures of whether the respondent liked school, tried hard in school, and liked their teachers (alphas at each grade ranged from 0.52 – 0.55; stability coefficient = 0.75). *Social skills* was based on 2 items measuring respondents' ability to make friends and be social (alphas for grades 9 – 12 ranged from 0.59 – 0.63; stability coefficient = 0.65). *Sensation seeking*, a constitutional factor, included 3 items and measured respondents' propensity to take risks regardless of danger or potential consequences (alphas for grades 9-12 were 0.65 – 0.69, stability coefficient = 0.85). ). A *healthy beliefs and clear standards* measure included 4 items assessing respondents' self-reported honesty and beliefs about morality (e.g., that cheating is wrong; alphas for all grades ranged from 0.61 – 0.69; stability coefficient = 0.88). Social norms were measured by two scales: *Positive peer behavior* was measured using participant reports of their friends' participation in prosocial activities (e.g.,

helping others; alphas for grades 9-12 ranged from 0.76 – 0.81; stability coefficient = 0.82). A measure of *negative peer behavior* was similarly created using participant reports of friends' involvement in antisocial activities (e.g., skipping school; alphas 0.84 – 0.91; stability coefficient = 0.89).

### Statistical Analyses

Because a large majority of respondents reported being in a relationship at all five time points, a separate latent class analysis was conducted on this variable, with the best-fitting model being a 2-class model. The largest class showed a high probability of always being in a relationship and the smaller class was less likely (but increasingly likely over time) to be in a relationship. The class probabilities from this analysis were saved out and included as a predictor in the sexual behavior latent class analysis. Sexual behavior latent class analyses were first run with the full sample using MPlus version 7 (Muthén & Muthén, n.d.). Latent class analysis (Clogg, 1995) was used to examine how the 5 indicators of adolescent sexual behavior (e.g., concurrent sexual partners, inconsistent condom use) interrelated across five time points (ages 19 through 23) to form distinct classes of sexual behavior. Model fit criteria such as the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) and interpretability were used to select the number of latent classes. With the full sample, model fit was not clear so we separated the sample and ran males and females separately. Separated by gender, model fit and interpretability improved. Models including 1 to 6 classes were estimated for both males and females, and the 5-class solution minimized the AIC and BIC, and provided substantively meaningful latent classes for both genders.

Next a latent class regression analysis using a 3-step approach was conducted (Asparouhov & Muthen, 2013; Vermunt, 2010). The 3-step approach allows the latent class

model to be estimated in the first step; in the second step a new variable for the most likely class for each observation is created, as well as a classification uncertainty using the latent class posterior distribution. In the third step the estimated class variable, along with the classification uncertainty, is used as an indicator variable with the latent class predictors included as auxiliary variables in the latent class regression.

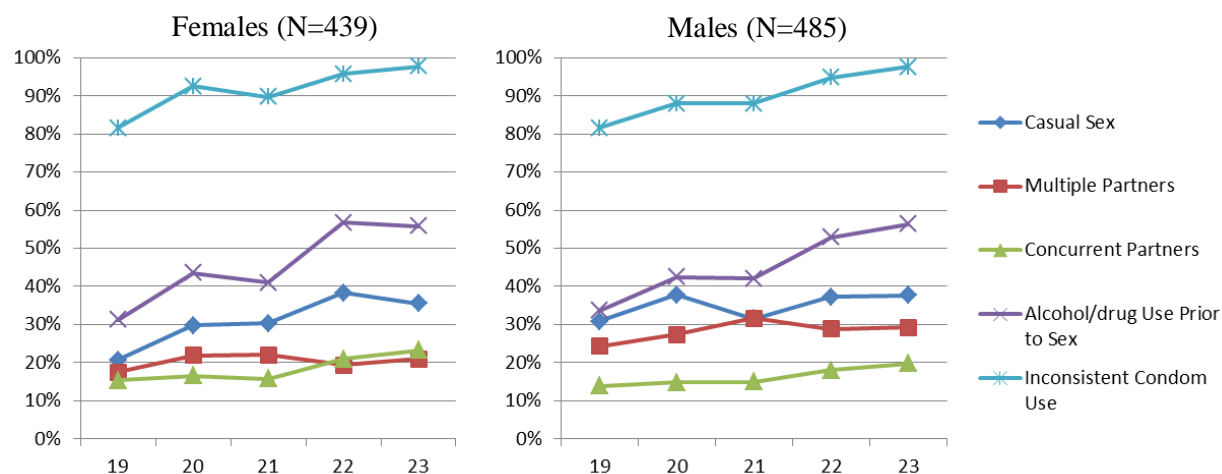


Figure 2.1. Percent reporting sexual behavior indicators, by gender

## Results

### Sexual Behavior by Gender

Figure 2.1 shows the percentage of females and males in the sample who reported each of the indicators of sexual behavior—casual sex, multiple partners, concurrent sexual partners, alcohol or drug use prior to having sex, and inconsistent condom use. Inconsistent condom use was high among both males and females and increased slightly over time, with over 90% of men and women not using condoms consistently at age 23. Having multiple partners (defined as 3 or more in the past year) was significantly more prevalent among male respondents compared to female respondents at ages 21 through 23 (29.3% vs. 21.3% respectively at age 23). The percentage of males reporting casual sex (i.e., sex with someone they were not in a relationship with and had known less than 2 weeks) was significantly higher than for females at ages 19 - 20

(for example, 30.8% vs. 22.8% at age 19). The prevalence of having concurrent sexual partners and reporting alcohol or drug use prior to having sex did not differ significantly by gender.

#### Latent Class Analysis Models

The latent class analysis examined patterns of individual involvement in sexual behaviors across time. Analyses compared models with one through six latent classes separately for males and females. Table 2.1 shows the fit statistics for the models separately by gender. For each set of models, the AIC and BIC (adjusted for sample size) indicated a 6-class model was the best fit, and BIC indicated the 5-class model was the best fit. After carefully examining the 5 and 6 class models, the 5-class models were selected because they best differentiated among qualitatively different patterns of behavior and the classes were more interpretable.

Table 2.1. Fit statistics for latent class models

<b>Number of Classes</b>	<b>Log Likelihood</b>	<b>Number of Free Parameters</b>	<b>AIC</b>	<b>BIC</b>	<b>aBIC</b>	<b>Entropy</b>
<b>Women</b>						
1	-5426.24	25	10902.49	11004.60	10925.26	n/a
2	-4701.29	51	9504.57	9712.88	9551.03	0.87
3	-4493.04	77	9140.08	9454.59	9210.23	0.88
4	-4367.57	103	8941.15	9361.85	9034.98	0.89
5	-4287.52	129	8833.04	9359.94	8950.55	0.90
6	-4209.30	155	8728.59	9361.69	8869.80	0.90
<b>Men</b>						
1	-6251.56	25	12553.12	12657.72	12578.37	n/a
2	-5359.12	51	10820.25	11033.64	10871.77	0.90
3	-5202.56	77	10559.11	10881.29	10636.90	0.88
4	-5085.27	103	10376.53	10807.50	10480.58	0.89
5	-4996.35	129	10250.70	10790.45	10381.02	0.89
6	-4931.25	155	10172.50	10821.05	10329.09	0.90

For each class, Figures 2.2a (females) and 2.2b (males) plot each of the 5 sexual behaviors for each of the latent classes. Both males and females had similar classes of sexual

behavior patterns, the differences were in the degree of different behaviors within the classes and the proportions of the male and female respondents in each class. Alcohol or drug use prior to sex differentiated between two lower risk sexual behavior classes in both genders. A pattern of Lower Risky Sex over time with a high probability of inconsistent condom use was estimated for 33.5% of females and 30.3% of males (“Lower Risky Sex” class). A second class with Lower Risky Sex and Substance Use Before Sex as well as inconsistent condom use was defined for 16.2% of females and 13.6% of males (“Lower Risky Sex + Substance Use Before Sex” class). For both genders there was a “Higher Risky Sex” class (16.9% of females, 25.2% of males), “Moderate Risky Sex” class (12.3% of females, 10.9% of males), and “Increasing Risky Sex” class (21.2% of females, 20.0% of males). Inconsistent condom use was high across time among both genders and in all sexual behavior classes.

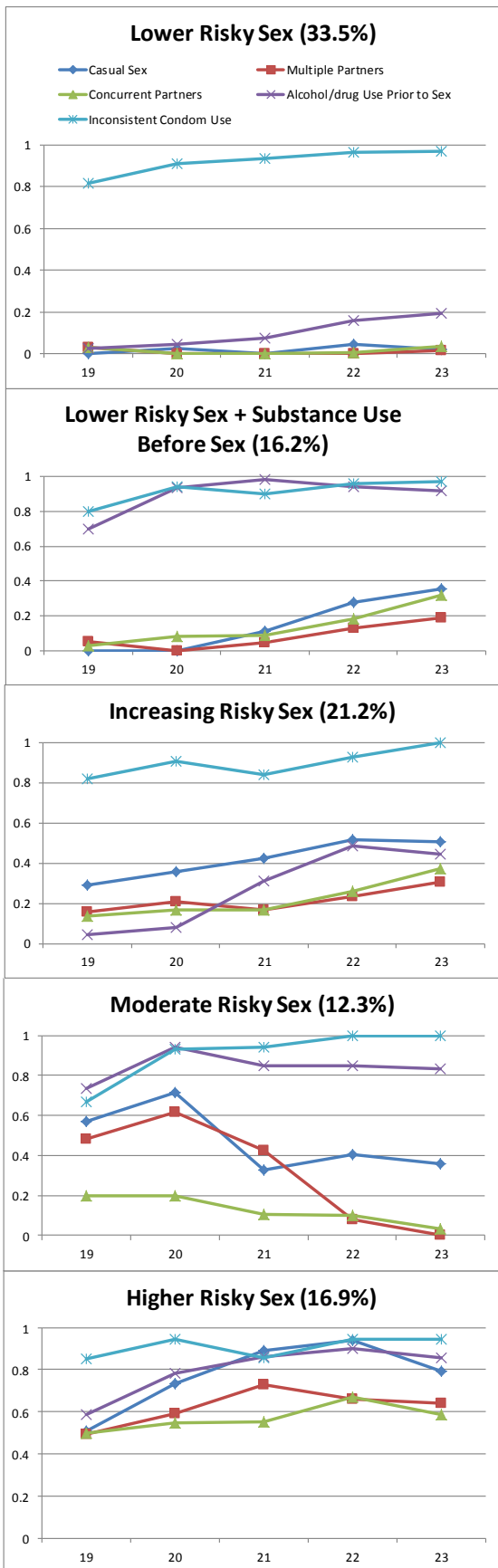


Figure 2.2a: Latent Classes. Females

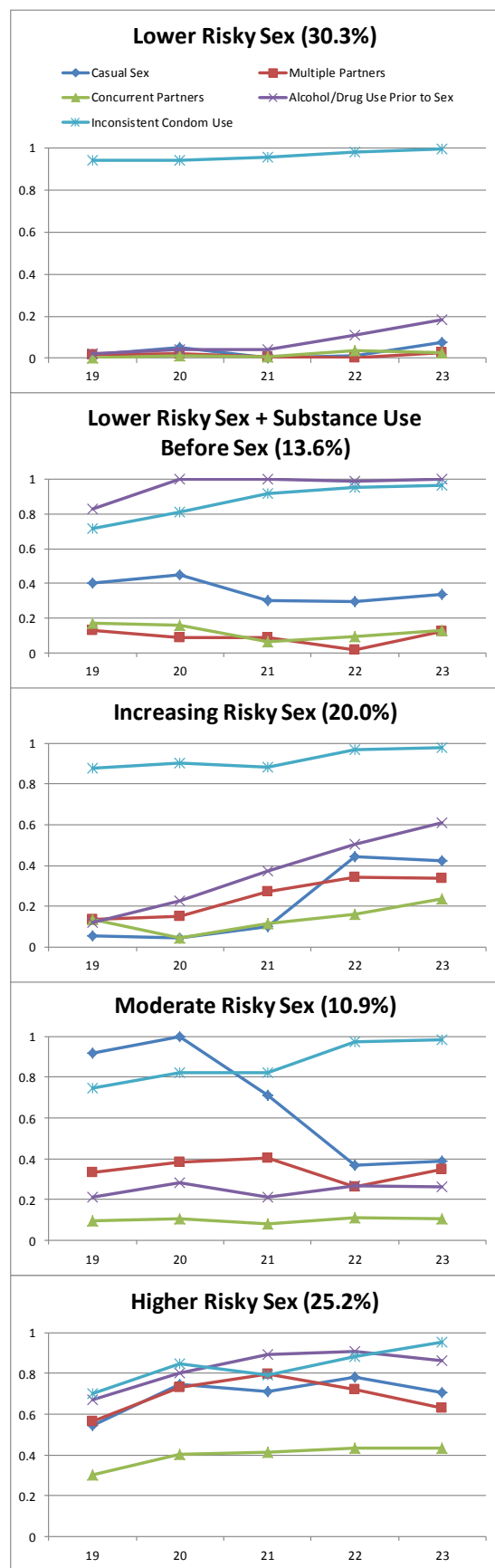


Figure 2.2b: Latent Classes, Males

Table 2.2 Descriptive statistics for predictors of latent classes

	Women (N=439)			Men (N=485)		
	%	M	SD	%	M	SD
<b><i>Sociodemographics</i></b>						
White	76.3			75.7		
Asian American	5.5			5.6		
Other race	18.2			18.8		
Latino	7.5			8.5		
Born to teen mother	11.4			8.6		
Free/reduced-price school lunch	30.1			30.1		
Attended College	32.2			27.9		
<b><i>Social Development Constructs</i></b> (grades 9-12)						
Parental Supervision (range 1-4)		3.4	0.4		3.3	0.4
Family Conflict (range 1-4)		2.1	0.6		2.0	0.5
School Bonding (range 1-4)		3.2	0.3		3.1	0.4
Social Skills (range 1-4)		3.2	0.5		3.2	0.5
Sensation Seeking (range 1-6)		2.5	0.9		3.1	1.0
Healthy Beliefs & Clear Standards (range 1-4)		3.4	0.4		3.1	0.5
Positive Peers (range 1-5)		4.0	0.6		3.8	0.6
Negative Peers (range 1-5)		2.3	0.8		2.4	0.8
<b><i>Additional Predictors</i></b>						
Age of Sexual Debut		17.6	2.3		17.8	2.4
Consistent Condom Use (grades 10-12)	27.2			37.2		
Multiple Partners (grades 10-12)	18.4			20.4		
In Romantic Relationship at all time points (19-23)	98.7			94.8		

### Predictors of Latent Class Membership

Table 2.2 provides descriptive statistics for the predictors of the latent classes. Results in Tables 2.3 (females) and 2.4 (males) present the odds ratio (OR), which is the exponentiated logit coefficient ( $e^B$ ), and the 95% confidence interval from the multivariate latent class regression on the predictor variables. Each latent class was compared to the Lower Risky Sex class. As there are many comparisons made within and across tables, the description of results is organized by domains of predictors: sociodemographics, earlier sexual behavior and relationship status, and finally social development.

Table 2.3. Multivariate Multinomial Logistic Regression of Latent Classes on Predictor Variables, Women

Predictor variables	Higher Risky Sex vs. Lower Risky Sex		Moderate Risky Sex vs. Lower Risky Sex		Increasing Risky Sex vs. Lower Risky Sex		Lower Risky Sex + Substance Use Before Sex vs. Lower Risky Sex	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b><i>Sociodemographics</i></b>								
Asian/Pacific Islander vs. White	2.00	(0.54 - 7.44)	0.99	(0.22 - 4.40)	0.88	(0.15 - 4.97)	1.11	(0.33 - 3.79)
Other race vs. White	0.87	(0.29 - 2.61)	1.88	(0.72 - 4.94)	1.81	(0.79 - 4.19)	0.58	(0.19 - 1.80)
Latino (yes=1)	0.74	(0.25 - 2.13)	1.00	(0.25 - 3.95)	0.10	(0.01 - 1.56)	0.28	(0.07 - 1.08)
Born to teen mother	0.75	(0.17 - 3.27)	0.43	(0.10 - 1.93)	1.07	(0.34 - 3.40)	1.14	(0.38 - 3.43)
Free/reduced-price school lunch	1.46	(0.65 - 3.26)	0.90	(0.38 - 2.12)	1.83	(0.78 - 4.30)	1.10	(0.52 - 2.34)
Attended College	1.68	(0.57 - 4.93)	0.90	(0.33 - 2.48)	2.64*	(1.13 - 6.13)	2.92*	(1.25 - 6.86)
<b><i>Earlier Sexual Behavior</i></b>								
Age of Sexual Debut	0.80	(0.33 - 1.95)	0.60	(0.25 - 1.46)	0.74	(0.31 - 1.72)	0.75	(0.37 - 1.51)
Consistent Condom Use (grades 10-12)	0.99	(0.76 - 1.29)	0.93	(0.72 - 1.20)	0.86	(0.64 - 1.16)	1.24	(0.98 - 1.58)
Multiple Partners (grades 10-12)	2.47***	(1.36 - 4.50)	2.02	(0.90 - 4.55)	2.04*	(1.04 - 4.01)	1.17	(0.63 - 2.17)
<b><i>Relationship Status</i></b>								
In Romantic Relationship at all time points (19-23)	1.55	(0.57 - 4.26)	2.11	(0.68 - 6.52)	2.03	(0.74 - 5.55)	2.44*	(1.01 - 5.89)
<b><i>Social Development Constructs</i></b>								
Parental Supervision (grades 9-12)	0.90	(0.29 - 2.84)	0.65	(0.17 - 2.41)	0.90	(0.25 - 3.28)	0.68	(0.24 - 1.96)
Family Conflict (grades 9-12)	1.47	(0.77 - 2.79)	2.82*	(1.36 - 5.84)	1.32	(0.65 - 2.66)	0.88	(0.51 - 1.52)
School Bonding (grades 9-12)	0.93	(0.29 - 2.97)	1.20	(0.27 - 5.43)	1.37	(0.47 - 4.03)	1.29	(0.48 - 3.45)
Social Skills (grades 9-12)	1.29	(0.75 - 2.21)	1.69	(0.75 - 3.80)	2.14*	(1.04 - 4.42)	1.10	(0.62 - 1.96)
Sensation Seeking (grades 9-12)	1.71	(0.94 - 3.10)	1.67	(1.00 - 2.79)	1.00	(0.53 - 1.88)	1.55	(0.98 - 2.45)
Healthy Beliefs & Clear Standards (grades 9-12)	0.86	(0.28 - 2.67)	1.59	(0.36 - 6.96)	0.51	(0.13 - 1.97)	1.10	(0.36 - 3.33)
Positive Peers (grades 9-12)	0.44*	(0.20 - 0.97)	0.39*	(0.16 - 0.91)	0.58	(0.23 - 1.47)	0.48	(0.24 - 0.95)
Negative Peers (grades 9-12)	1.45	(0.68 - 3.09)	0.39	(0.18 - 0.85)	0.79	(0.35 - 1.79)	1.70	(0.89 - 3.23)

\*p&lt;.05 \*\*p&lt;.01 \*\*\*&lt;.001

Table 2.4. Multivariate Multinomial Logistic Regression of Latent Pathways on Predictor Variables, Men

Predictor variables	Higher Risky Sex vs. Lower Risky Sex		Moderate Risky Sex vs. Lower Risky Sex		Increasing Risky Sex vs. Lower Risky Sex		Lower Risky Sex + Substance Use Before Sex vs. Lower Risky Sex	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b><i>Sociodemographics</i></b>								
Asian/Pacific Islander vs. White	1.58	(0.43 - 5.79)	1.12	(0.21 - 6.05)	1.25	(0.35 - 4.49)	0.00*	(0.00 - 0.00)
Other race vs. White	2.35	(0.99 - 5.61)	1.38	(0.44 - 4.29)	0.87	(0.33 - 2.31)	1.22	(0.39 - 3.84)
Latino (yes=1)	0.88	(0.31 - 2.48)	1.44	(0.45 - 4.56)	0.84	(0.28 - 2.49)	0.62	(0.11 - 3.40)
Born to teen mother	2.05	(0.56 - 7.56)	2.47	(0.68 - 9.06)	1.79	(0.52 - 6.19)	2.25	(0.52 - 9.61)
Free/reduced-price school lunch	0.35**	(0.17 - 0.73)	0.51	(0.22 - 1.19)	0.61	(0.30 - 1.25)	0.32*	(0.13 - 0.81)
Attended College	0.69	(0.29 - 1.63)	0.79	(0.29 - 2.15)	0.91	(0.38 - 2.19)	0.84	(0.32 - 2.24)
<b><i>Earlier Sexual Behavior</i></b>								
Age of Sexual Debut	0.86	(0.42 - 1.77)	1.12	(0.53 - 2.34)	0.88	(0.45 - 1.71)	1.06	(0.48 - 2.31)
Consistent Condom Use (grades 10-12)	1.51***	(1.21 - 1.88)	1.38*	(1.06 - 1.79)	1.37**	(1.09 - 1.73)	1.40**	(1.11 - 1.75)
Multiple Partners (grades 10-12)	1.54*	(1.04 - 2.29)	1.23	(0.78 - 1.92)	1.03	(0.68 - 1.56)	0.97	(0.59 - 1.60)
<b><i>Relationship Status</i></b>								
In Romantic Relationship at all time points (19-23)	2.91**	(1.37 - 6.19)	1.74	(0.76 - 3.96)	1.82	(0.83 - 3.98)	5.68***	(2.67 - 12.08)
<b><i>Social Development Constructs</i></b>								
Parental Supervision (grades 9-12)	1.04	(0.37 - 2.88)	0.63	(0.19 - 2.09)	0.25*	(0.07 - 0.92)	2.71	(0.91 - 8.13)
Family Conflict (grades 9-12)	2.14*	(1.05 - 4.39)	0.86	(0.34 - 2.19)	0.86	(0.39 - 1.90)	1.00	(0.47 - 2.12)
School Bonding (grades 9-12)	1.54	(0.62 - 3.82)	3.64	(0.88 - 15.00)	1.41	(0.48 - 4.21)	1.51	(0.58 - 3.94)
Social Skills (grades 9-12)	0.62	(0.37 - 1.02)	0.74	(0.44 - 1.24)	1.11	(0.61 - 2.03)	0.67	(0.41 - 1.09)
Sensation Seeking (grades 9-12)	1.45	(0.96 - 2.18)	1.07	(0.64 - 1.80)	1.23	(0.80 - 1.88)	2.18**	(1.38 - 3.45)
Healthy Beliefs & Clear Standards (grades 9-12)	0.31*	(0.12 - 0.80)	0.60	(0.17 - 2.09)	0.51	(0.18 - 1.44)	0.37	(0.13 - 1.05)
Positive Peers (grades 9-12)	1.13	(0.60 - 2.12)	0.71	(0.32 - 1.56)	2.13*	(1.03 - 4.39)	0.73	(0.36 - 1.51)
Negative Peers (grades 9-12)	0.88	(0.48 - 1.62)	0.99	(0.47 - 2.08)	1.54	(0.88 - 2.72)	1.45	(0.79 - 2.63)

\*p&lt;.05 \*\*p&lt;.01 \*\*\*&lt;.001

### Sociodemographic predictors

Females who attended college were significantly more likely than those who did not attend college to be in the Lower Risky Sex + Substance Use Before Sex and Increasing Risky Sex classes compared to the Lower Risky Sex class. Male Asian/Pacific Islander respondents and those who received free/reduced-price school lunch during elementary school were significantly less likely to be in the Lower Risky Sex + Substance Use Before Sex class compared to the Lower Risky Sex class. Males who received free/reduced-price school lunch were also less likely to be in the Higher Risky Sex class. No other sociodemographic characteristics significantly predicted class membership.

### Prior sexual behavior and relationship status

Earlier sexual behaviors were significant predictors of class membership. Females who reported having multiple partners during high school were 2.47 times as likely to be in the Higher vs. Lower Risky Sex class, and 2.04 times as likely to be in the Increasing vs. Lower Risky Sex class. Neither sexual debut nor high school inconsistent condom use was predictive for females. For males, high school history of multiple partners was predictive of being in the Higher vs. Lower Risky Sex class (OR=1.54), and more consistent condom use during high school was predictive of being in each of the higher risk patterns of behavior. Early sexual debut was not predictive for males.

Females who reported being in a relationship were 2.44 times as likely to be in the Lower Risky Sex + Substance Use Before Sex class compared to the Lower Risky Sex class. For males, being in a romantic relationship at all time points (ages 19 – 23) increased the odds of being in the Higher Risky Sex class by 2.91 times, and increased the odds of being in the Lower Risky Sex + Substance Use Before Sex class by 5.68 times compared to the Lower Risky Sex class.

### Social development predictors

Females who reported higher family conflict during high school were more likely to be in the Moderate Risky Sex class than the Lower Risky Sex class (OR=2.82). Contrary to what was hypothesized, stronger social skills among females predicted greater likelihood of being in the Increasing Risky Sex class over the Lower Risky Sex class (OR=2.14). Having peers who engaged in positive activities during high school reduced the likelihood of females being in the Higher or Moderate Risky Sex classes compared to the Lower Risky Sex class (OR= .44 and .39, respectively). Among males, greater parental supervision during high school predicted reduced likelihood of being in the Increasing Risky Sex class compared to the Lower Risky Sex class (OR=.25), while higher levels of family conflict during high school doubled the likelihood of males being in the Higher Risky Sex class compared to the Lower Risky Sex class (OR=2.14). Males who reported more sensation seeking behaviors were twice as likely to be in the Lower Risky Sex with Substance Use class as the Lower Risky Sex class (OR=2.18). Having healthy beliefs and clear standards during high school significantly reduced the likelihood of being in the Higher Risky Sex class compared to the Lower Risky Sex class among males (OR=.31). Interestingly, having positive peers during high school increased the likelihood of males being in the Increasing Risky Sex class compared to the Lower Risky Sex class (OR=2.13).

### Discussion

This study identified five classes of sexual behavior among young people ages 19 to 23. Latent classes were estimated separately for males and females, but overall the sexual behavior classes estimated were similar between the genders. The primary differences are in the proportions of males and females in each of the classes, and the prevalence of the individual sexual risk behaviors within each class by gender. For both young men and women the Lower

Risky Sex class had the largest prevalence. A greater proportion of males were estimated to be in the Higher Risky Sex class than females (25.2% vs. 16.9%), which is in line with some previous research showing male adolescents were more likely to be involved in risky sexual behavior (Caminis et al., 2007), but it is counter to the findings of other studies examining the trajectories of sexual behavior during adolescence and young adulthood (Fergus et al., 2007; Huang et al., 2012). For example, Huang and colleagues (2012) found that males and females were equally likely to be in their Higher risk trajectory, but males were more likely to be in the Decreased risk (from adolescence into young adulthood) while females were more likely to be in the early Increased risk trajectory. Fergus and colleagues (2007) found that boys exhibited higher levels of risky sex early in high school but girls reported more risky sex by the end of high school. These differences in findings may be due to age and demographic differences of the samples, but it may also be in part due to the use of composite sexual risk variables in the previous studies. The current study examined multiple measures of sexual behavior to identify classes of behavior.

Within the similar classes for males and females, the prevalence of some of the different sexual behaviors appeared to vary by gender. For example, the proportion of young women in the Higher Risky Sex class reporting concurrent sexual partners was higher than males in the similar class, while males had a higher probability of reporting multiple partners. This higher level of concurrent partners among young women is important; previous research has shown that having concurrent sexual partners is a significant risk for acquiring STI (Aral & Leichliter, 2010). In the Moderate Risky Sex classes, the proportion of females reporting use of alcohol or other drugs prior to having sex was higher than the proportion of males reporting the same. This finding has potential implications for prevention; substance use prior to sexual activity may

influence young women's decisions around safer sex behavior. In addition, using alcohol or drugs before having sex differentiated between two lower risky sexual behavior classes.

However, Figures 2.2a and 2.2b show that the probabilities of reporting multiple and concurrent sexual partners as well as casual sex appear higher in the Lower Risky Sex + Substance Use Before Sex classes for both males and females than in the Lower Risky Sex class. This suggests that using alcohol or other drugs does indeed contribute to riskier sexual behavior, even among young adults who exhibit a relatively low risk pattern of sexual behavior.

It is also noteworthy that the rate of inconsistent condom use was high across all sexual behavior classes and among both genders. For this study, inconsistent condom use was defined as less than always using a condom. One thing this study was not able to determine, however, was to what extent the high rate of inconsistent condom use was due to non-use with long-term romantic partners. Consistent condom use with sexual partners outside of a long-term romantic relationship may reduce the 'riskiness' of these behaviors. However, even among those who always reported being in a romantic relationship, there was a relatively high rate of casual sex, multiple partners, and concurrent partners reported so consistent condom use is still important. Future research should examine further whether condoms are being used consistently with non-romantic partners but not with longer-term romantic partners, which could have an impact on the likelihood of STI acquisition.

Measures of average high school sexual risk behavior were included in the latent class regression analysis models. As anticipated, both males and females who reported multiple sexual partners during high school were more likely to be in a higher risk sex behavior pattern during young adulthood. However, males who reported consistent condom use during high school were also more likely to be in any of the higher risk sex behavior patterns compared to the

Lower Risky Sex class. This is an interesting finding that should be further examined in future research. It is possible that there is a selection effect, that males who used condoms more consistently during high school are more sexually active overall which could help explain a higher risk pattern of behavior during young adulthood. Also of note is that age of sexual initiation was not a significant predictor of young adult sexual behavior class membership. These findings are important because early sexual initiation has been found to be a strong predictor of STI acquisition, and many sexual risk reduction interventions aim to delay age of sexual initiation. Previous research by Epstein and colleagues found that lifetime number of sexual partners fully explained the relationship between early sexual initiation and STI acquisition in one longitudinal data set, and partially explained the relationship in another data set (Epstein et al., 2014). The same study found that behavioral disinhibition (or, sensation seeking) was a common predictor of several risk factors for STI, including early sexual initiation, using drugs or alcohol before sex, and early alcohol use. It is likely the constellation of sexual behaviors that combine to create increased risk for STI—so while early sexual initiation is an important indicator of sexual risk, it is also important to look at other behaviors young people are engaged in.

Also interesting was that being in a relationship at each of the time points was associated with a higher risk sexual behavior pattern. Females who reported always being in a relationship were more likely to use drugs or alcohol before sex, which is often associated with higher risk sexual behavior. Males who were always in a relationship were more likely to be in a higher risk sex behavior class overall. These results may reflect differences in how young people define being in a relationship and the length of the relationship(s). Some participants may report being in a relationship after a few dates with a partner, while others may not report being in a

relationship until they have been dating exclusively for a period of time. How these concepts are defined likely varies by gender. In this study we were not able to tease apart how long they had been in a relationship or whether the relationship reported at one wave was with the same partner as a relationship reported in another wave. However, even with this limitation males who reported being in a relationship were also more likely to report having multiple partners (>3 in the past year) and casual sex (defined as sex with someone outside of a relationship).

Several social development constructs measured during high school were included as potential predictors of the estimated sexual behavior classes during young adulthood. The social development model was originally developed as a theory of antisocial behavior (Catalano & Hawkins, 1996), describing parallel prosocial and antisocial developmental pathways. Sexual behavior is different than the antisocial behaviors the SDM has been applied to more frequently, such as substance misuse, violence, and delinquency, in that the goal is not to prevent it entirely but rather to promote healthier sexual behavior choices. However, previous studies showed that social processes described by the SDM did predict sexual behavior during adolescence and later STI risk (K.G. Hill et al., 2013; Lonczak et al., 2002). The current study showed that two family-level predictors were associated with young adult sexual behavior classes in the expected direction. Having stronger external constraints, measured by greater parental supervision during high school, was protective for men but it was not a significant predictor for females. Also, higher levels of family conflict (lower family bonding) during high school predicted a 2-fold increase in the probability of membership in the Higher Risky Sex class compared to the Lower Risky Sex class for young men, and an almost 3-fold increase in the probability of membership in the Moderate Risky Sex class compared to the Lower Risky Sex class for young women. Previous research has shown that positive family environments and relationships are associated

with safer sexual behavior during adolescence (Markham et al., 2010); this finding suggests these associations may continue into young adulthood.

At the peer level, having friends during high school who were engaged in positive activities such as after school clubs or sports was protective for young women but not young men. At the individual level males who reported having healthy beliefs and clear standards during high school were about 70% less likely to be in the Higher Risky Sex class compared to the Lower Risky Sex class. The only individual characteristic that was a significant predictor of membership in the young adult sexual behavior classes was social skills; young women who reported stronger social skills in high school were two times as likely to be in the Increasing Risky Sex class compared to the Lower Risky Sex class. This finding is counter to the predictions of the SDM, in which positive social skills are thought to lead to 'prosocial' behavior, or, in this case, less risky sexual behavior. However this finding may indicate that the development of sexual behavior patterns indeed is different than the antisocial behaviors the SDM was originally developed to understand. Also, the measure of social skills used in this study is related to sociability. It is possible that young women with stronger social skills may have more opportunities for a variety of sexual behaviors given their sociability, which could increase their likelihood of being in a higher risk sexual behavior pattern.

This study has several limitations that should be considered. First, the sample was limited geographically. Second, there were small proportions of African American, Native American, and Hispanic participants, which did not allow detailed comparisons of these groups. Rather than exclude these participants, they were grouped together for analysis. Although this strategy is more inclusive, it ignores important cultural differences. Second, all of the measures were self-report. However, the sensitive questions related to sexual behavior were self-administered, which

should reduce social desirability bias. Third, the measure for alcohol/drug use prior to having sex does not differentiate the type of substance used (e.g., alcohol which becomes legal at age 21 compared to illicit drugs) nor does it describe the amount of alcohol or drugs used, so it is possible this measure captures responsible use of legal alcohol. Lastly, this study did not explore whether condoms were used consistently with long-term romantic partners vs. with more casual sexual partners. This differentiation is likely important to understanding the sexual behavior patterns of young adults and the relationship between the distinct patterns of behavior and acquiring an STI. However, membership in a higher risky sex behavior pattern did predict ever having had an STI by age 24 so even without this more fine understanding of condom use the classes seem to be valid.

Despite these limitations, this study made several contributions to the literature on adolescent and young adult patterns of sexual behavior. First, it used latent class analysis to identify five distinct classes of sexual behavior over five years, from age 19 to 23. Second, it showed that young adult men and women exhibit similar patterns of sexual behavior, however there are important differences in the levels of individual sexual risk behaviors within the behavior patterns and in the proportion of males and females estimated to be in the Higher Risky Sex class. Third, this study showed that risk and protective socialization processes during adolescence did impact sexual behavior during young adulthood.

Gaining insight into the patterns and prevalence of different types of sexual behavior is informative for understanding what types of health promotion messages might be most beneficial for young men and women at different ages. For example, young men were more likely to report having casual sex (that is, sex outside of a romantic relationship with someone they had known less than 2 weeks) at almost every time point between ages 19 and 23 years, and were also more

likely to report having more than 3 sexual partners each year during those same time points.

However, young women were more likely to report having concurrent sexual partners (defined as having sex with another person while also having sex with a romantic partner) at each time point.

These sexual behaviors have implications for the spread of STI's, especially given the high rate of inconsistent condom use reported. Intervention messaging for young men and women may

benefit from greater specificity of how specific patterns of sexual behavior increase risk for STI.

Also, this study supports previous research in showing that earlier risky sexual behavior predicts

continued risky sexual behavior, so skills and knowledge to promote safer sexual behavior

during adolescence is critical. Finally, the findings that family and peer socialization processes

are associated with young adult sexual behavior suggest that sex education programs should

include activities to promote positive family environments and positive peer norms and

relationships.

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**PAPER 3: PATTERNS OF SEXUAL BEHAVIOR DURING  
ADOLESCENCE AND YOUNG ADULTHOOD:  
ASSOCIATION WITH LATER HEALTH AND SOCIAL OUTCOMES**

**Introduction**

Adolescence and young adulthood are critical periods of transition from childhood into adulthood. This stage of development is also when patterns of behavior are established, so adolescence and young adulthood are important times in young people's lives not only because of the opportunity to ensure the formation of healthy behaviors, but also because poor health behaviors during this time can increase the risk for chronic disease later in life, such as heart disease due to an unhealthy diet and physical inactivity, or addictions due to binge drinking or illicit drug use (Institute of Medicine & Council, 2013). Sexuality is an important component of overall health (Office of the Surgeon General, 2001) and is integrally related to social, mental, and physical health. Risky sexual behavior is relatively common among adolescents and young adults, and young people are disproportionately affected by both sexually transmitted infections (STI) and unintended pregnancy. Each year, young people ages 15 to 24 acquire almost half of new STIs, although they make up only 25% of the sexually experienced population (Satterwhite et al., 2013). Additionally, women ages 18 to 24 have the highest rate of unintended pregnancy of all age groups (Finer & Zolna, 2014).

This study examines patterns of sexual behavior from ages 19 to 23, which encompasses a period of profound changes in the lives of youth. For many young people, sexual behavior choices become riskier as they move from adolescence into young adulthood. Their social environment shifts away from their family of origin and high school (Bailey, Haggerty, White, & Catalano, 2011), and social norms among their peers change (Garcia, Reiber, Massey, & Merriwether, 2012). Research has shown an association between single 'risky' sexual behaviors (e.g., concurrent sexual partners, inconsistent condom use, or using alcohol or other drugs before

having sex) and STI (Diamond & Savin-Williams, 2009). However less research has investigated whether there are combinations of sexual behaviors that are part of a behavioral pattern that increase or decrease the likelihood of acquiring an STI or having an unintended pregnancy.

Furthermore, little research has looked at what “healthy” sexual behavior is during adolescence and young adulthood. Early sexual activity is assumed to be problematic, but given that partnered sexual behavior prior to marriage is statistically normative (Centers for Disease Control and Prevention, 2006-2010), we need to know more about whether there are patterns of sexual behavior that are associated with more positive health and social outcomes during adulthood. While sexual behavior carries with it risks for negative consequences, it is also a part of the healthy development of adolescents and young adults.

Several studies have examined patterns of sexual risk behavior among adolescents and young adults. A study by Haydon and colleagues looked at patterns of sexual initiation (Haydon, Herring, Prinstein, & Halpern, 2012) and their association with early adult sexual health outcomes, and found that early patterns of risky sexual behavior may not predict later STI diagnosis and risky sexual behavior (Haydon, Herring, Halpern, & Carolyn, 2012). Other studies examined the trajectory of sexual risk behavior across adolescence and young adulthood using composite measures (Fergus, Zimmerman, & Caldwell, 2007; Huang, Murphy, & Hser, 2012), or using a mean level of sexual risk behavior over time (Capaldi, Stoolmiller, Clark, & Owen, 2002). However, no studies have looked more holistically at the patterns of sexual behaviors over time during adolescence and young adulthood.

Research investigating how patterns of risky sexual behavior are associated with social and health outcomes during early adulthood could provide insights into what healthier sexual behavior might look like during adolescence and young adulthood. The direct health outcomes of

riskier sexual behavior, unintended pregnancy and STI, are well known. Previous research has also shown a possible link between adolescent risky sexual behavior and mental health outcomes such as depression (Mazzaferro et al., 2006). However less is known about how patterns of sexual behavior might be associated with other positive and negative physical health and social outcomes. Research has shown, though, that STI and unintended pregnancy can come with steep costs. For example, pregnant and teen mothers are less likely to graduate high school (Perper, Peterson, & Manlove, 2010), and the health and economic effects can continue into the next generation--children of teen parents are more likely to have health problems, lower school achievement, drop out of high school, have a child as a teenager, and be unemployed during young adulthood (Hoffman, 2008). So it may be the consequences of riskier sexual behavior that lead to later negative economic and social outcomes, however statistically we know that young people who grow up in a lower socioeconomic status are more likely to take part in unprotected sex and to get pregnant or get someone pregnant (Kirby & Lepore, 2007). Therefore, it is important to try to tease apart whether other structural issues such as income influence the association between sexual behavior patterns during adolescence and young adulthood and later social outcomes such as receiving public assistance.

In a previous study (Gloppen, dissertation paper 2), 5 classes of sexual behavior from ages 19 to 23 were empirically identified using latent class analysis separately for males and females (see Figures 2.2a and 2.2b). Twenty five variables (5 indicators over 5 time points) were used to identify the classes (Lower Risky Sex, Lower Risky Sex + Substance Use Before Sex, Increasing Risky Sex, Moderate Risky Sex, and Higher Risky Sex). The classes were similar across genders, differing only in the proportion of the sample in each class, and the prevalence of specific sexual risk behaviors within each class. Unfortunately, inconsistent condom use was

high across time among both genders and in all sexual behavior classes. A pattern of Lower Risky Sex with a high probability of inconsistent condom use was estimated for 33.5% of females and 30.3% of males. A second class with Lower Risky Sex + Substance Use Before Sex prior to sex and inconsistent condom use was defined for 16.2% of females and 13.6% of males. For both genders there was a Higher Risky Sex class that had higher levels of sexual risk across the indicators (16.9% of females, 25.2% of males), Moderate Risky Sex class (12.3% of females, 10.9% of males), and Increasing Risky Sex class (21.2% of females, 20.0% of males).

This study examines whether these latent classes of sexual behavior during the transition from adolescence to young adulthood predict positive and negative health and social outcomes at age 24. Social outcomes include being married or engaged, having one or more children, ever having been pregnant or gotten someone pregnant, being employed, or receiving public assistance. Health outcomes include overall perceived health, perceived physical and mental health, depression, alcohol abuse or dependence, and drug abuse or dependence. Finally, we examine gender differences in health and social outcomes.

## **Methods**

### **Participants and Procedure**

This study used data from the Raising Healthy Children (RHC) study. Participants were recruited into the study in the fall of 1993 and 1994 when they were in 1st or 2nd grade at one of ten public elementary schools in a suburban school district in the Pacific Northwest. Ten of the 25 elementary schools in the district were selected on the basis of having student populations with the highest aggregate measures of risk as defined by low SES and poor attendance patterns. Families of 1st- and 2nd-grade students from within these schools were recruited into the longitudinal study. To be eligible, students had to remain in their school throughout the entire

first year of their participation in the study and have a parent who spoke English, Spanish, Korean, or Vietnamese. In Year 1, 938 of the eligible 1,239 students provided written parental consent to participate in the study. In Year 2, the sample was augmented with an additional 102 students from a second eligible pool of 131 students who newly entered the project schools during 2nd grade, yielding a total sample of 1,040 students. Schools in the study were matched on risk factors including low income status, ethnicity, single-parent families, low reading scores, high absenteeism, and mobility. One school from each matched pair was assigned randomly to either the intervention or control condition. Information on the RHC study has been reported previously (for more information, see Catalano et al., 2003).

The sample was 53% male, and was racially/ethnically diverse: 75.3% White, 6.7% Asian or Pacific Islander, and 18.0% other (Native American, African American, or mixed race); 8.6% were Hispanic. Twenty-nine percent of students were from low-income households, indicated by the student having received free/reduced price lunch during the 4th and 5th grades. Completion rates for student surveys were greater than 89% during high school (grades 10-12) and greater than 85% during ages 19 - 24. Attrition was not related to gender, ethnicity, or low-income status (i.e., whether they received free/reduced-price school lunch in the first 2 years of the project).

Students were interviewed annually from grades 1 or 2 through grade 12, twice per year in the two years following high school, and then again annually through age 24/25. The present study used participant self-report data from ages 16 through 24. Parents gave active written consent for themselves and their child at the start of the study, and children gave active written assent each year. At age 18 participants gave active consent to continue in the study. Student data in grades 10 through 12 were collected using computer-assisted personal interviewing

(CAPI). For sensitive questions, such as those related to sexual activity, the computer was turned over to the respondent for self-administration. Post-high school waves of data were collected using a combination of CAPI and web-based survey administration. Previous analyses of these data showed there were no significant differences in response by mode of survey administration (McMorris, Petrie, Catalano, & Fleming, 2009). The study was approved by the University of Washington Institutional Review Board. Because these analyses looked at sexual behaviors, those respondents who reported never having sex by age 24 (63 or 11.5% of males, 53 or 10.8% of females) were excluded from the study.

## Measures

### *Indicators of Sexual Behavior*

To examine sexual behavior over time, the analysis used data collected when participants were 19, 20, 21, 22, and 23 years old (2005 - 2010). At each time point, participants reported whether they had engaged in casual sex in the past month, had multiple sexual partners in the past year, had concurrent sexual partners in the past year, used condoms inconsistently in the past month, or used alcohol or drugs prior to having sex in the past month. A dichotomous measure of *casual sex* was based on whether the respondents reported that they had sex with someone they did not “consider to be a boyfriend or girlfriend, that is [outside of] an exclusive relationship,” or had sex with a partner the respondent had known for less than 2 weeks. A dichotomous *multiple partners* variable was created based on whether the respondent reported sex with more than three partners in the past year. A measure of *concurrent sexual partners* (0 *no*, 1 *yes*) was created by combining responses to questions about whether the respondent or their boyfriend/girlfriend had sex with another person during their relationship. An *alcohol/drug use prior to having sex* variable measured how often respondents reported drinking or using drugs

before having sex (coded as 0 *never* or 1 *at least some of the time*). *Inconsistent condom use* was based on whether or not the respondent reported always using condoms for vaginal or anal sex.

*Sociodemographic variables.* Self-reported *race* was represented by mutually exclusive dummy variables for Asian American and Other (African American, Native American, mixed race), with White as the reference category. Hispanic *ethnicity* (1=yes, 0=no) was self-reported. Participation in the National School Lunch and School Breakfast program in grade 4 or 5 was included as a measure of childhood *socioeconomic status* (1=participated, 0=did not participate). Whether each respondent was *born to a teenage mother* was coded as 1 if the mother was 19 years old or younger at their birth or 0 if the mother was older than 19 years old. A measure of *college attendance* was created by combining self-reported measures of attendance at a 2- or 4-year college at each wave.

#### Young Adult Outcomes

A count of *Sexually Transmitted Infections* was created for the number of times a respondent reported that a doctor or nurse had told them they had any STI (such as gonorrhea, chlamydia, etc.) by age 24. A dichotomous variable was created for whether or not female respondents reported *ever being pregnant* and male respondents reported *getting someone pregnant* (0=no, 1=yes). A variable was created for whether or not respondents *had a child* by age 24 (0=no, 1=yes). Two dichotomous questions related to the economic situation of respondents were created, including being *currently employed* and whether the respondent had received any kind of *public assistance* in the past year (e.g., food stamps, TANF). Three questions related to respondents' perceived health were included. Respondents rated their *overall health* on a Likert scale from 1 *poor* to 4 *excellent*; and they estimated the number of days in the past month that their *physical health* and *mental health* were poor. Measures of whether

respondents met DSM-IV criteria (0=no, 1=yes) for *depression, alcohol abuse or dependence, and drug abuse or dependence* were based on the CIDI (World Mental Health Composite International Diagnostic Interview), which was administered at age 23. Table 3.1 shows the sociodemographics and young adult outcome statistics for the sample.

Table 3.1. Descriptive statistics for sociodemographics and outcomes

	Women (N=439)			Men (N=485)		
	%	M	SD	%	M	SD
<b><i>Sociodemographics</i></b>						
White	76.3			75.7		
Asian American	5.5			5.6		
Other race	18.2			18.8		
Latino	7.5			8.5		
Born to teen mother	11.4			8.6		
Free/reduced-price school lunch (grade 4-5)	30.1			30.1		
Attended college (community or 4-year college)	32.2			27.9		
<b><i>Outcomes</i> (At age 24)</b>						
Marital status	36.0*			23.2		
Ever pregnant/gotten someone pregnant	56.7*			47.5		
Have child(ren)	27.0*			13.9		
STI (count) <sup>†</sup>		0.99*	1.89		0.30	1.12
Currently employed	68.4*			75.6		
Received public assistance, past year	25.3*			13.2		
Overall health (poor to excellent, 1 to 4)		3.04	0.70		3.13	0.72
# days poor physical health, past month		3.03*	6.49		1.76	4.60
# days poor mental health, past month		5.15*	8.19		2.74	6.15
Depression	16.6*			11.2		
Alcohol abuse/dependence	25.9*			36.7		
Drug abuse/dependence	27.7*			38.6		

\*Means and proportions significantly different ( $p < 0.05$ ) among males and females.  
<sup>†</sup>15.5% of females and 10.9% of males ever reported at least one STI.

Table 3.2. Fit statistics for latent class models

Number of Classes	Log Likelihood	Number of Free Parameters	AIC	BIC	aBIC	Entropy
<b>Women</b>						
1	-5426.24	25	10902.49	11004.60	10925.26	n/a
2	-4701.29	51	9504.57	9712.88	9551.03	0.87
3	-4493.04	77	9140.08	9454.59	9210.23	0.88
4	-4367.57	103	8941.15	9361.85	9034.98	0.89
5	-4287.52	129	8833.04	9359.94	8950.55	0.90
6	-4209.30	155	8728.59	9361.69	8869.80	0.90
<b>Men</b>						
1	-6251.56	25	12553.12	12657.72	12578.37	n/a
2	-5359.12	51	10820.25	11033.64	10871.77	0.90
3	-5202.56	77	10559.11	10881.29	10636.90	0.88
4	-5085.27	103	10376.53	10807.50	10480.58	0.89
5	-4996.35	129	10250.70	10790.45	10381.02	0.89
6	-4931.25	155	10172.50	10821.05	10329.09	0.90

### Statistical Analyses

Latent class analyses were used to identify discrete patterns of sexual behavior over time. Analyses proceeded in several steps. With the full sample, model fit was not clear so we separated the sample and conducted the analyses separately for males and using MPlus version 7 (Muthén & Muthén, n.d.). First, the latent class measurement model was estimated using 5 indicators of adolescent sexual behavior (casual sex, multiple partners, concurrent sexual partners, substance use prior to sex, and inconsistent condom use) across five time points (ages 19 through 23; see dissertation paper 2 for more details). Models were estimated with an increasing number of latent classes (from 1 to 6 classes) while controlling for sociodemographic characteristics. A 5-class model was selected based on model fit, using the Akaike Information Criterion and the Bayesian Information Criterion (see Table 3.2 for fit indices) and substantive interpretability. Next, a model-based approach (Asparouhov & Muthen, 2013; Lanza, Tan, &

Bray, 2013) using the auxiliary function in MPlus to estimate latent class-specific distributions of the social and health outcomes. This method gives less biased estimates of the associations between latent classes and distal outcomes than other approaches, and does not allow the distal outcomes to change the latent class structure (Lanza, Tan, & Bray, 2011). Latent class models with and without the sociodemographic control variables were run, and because the model fit, 5-class structure, and substantive meaning of the classes did not change the control variables were not included in the final model.

## **Results**

Overall, the prevalence of the social and health outcomes was significantly different among young men and women. Women at age 24 were significantly more likely to be married or engaged, to have been pregnant/gotten someone pregnant, to have at least one child, and to have received public assistance in the past year than men. Men at age 24 were more likely to report being currently employed. There was no difference in the reported level of overall health among men and women, however women reported significantly more days in the past month when their mental and physical health were not good. Men at age 24 were more likely to meet the DSM-IV criteria for alcohol or drug abuse or dependence, and women were more likely to meet criteria for depression. Women were also more likely to have been told they had one or more STIs than men (15.5% vs. 10.9%, respectively). These differences by gender are in line with national data (Centers for Disease Control and Prevention, 2013; Substance Abuse and Mental Health Services Administration, 2013)

### **Patterns of Sexual Behavior and Social Outcomes**

Table 3.3 shows the relationship between the latent classes of sexual behavior from ages 19 to 23 and social outcomes at age 24. Women in the Higher Risky Sex class were significantly

Table 3.3. Social outcomes, by gender and sexual behavior latent class

	Marital status % (SE)	Ever pregnant/ gotten someone pregnant % (SE)	Have child(ren) % (SE)	Currently employed % (SE)	Received public assistance, past year % (SE)
<b>Females</b>					
Lower Risky Sex*	44.7 (4.5)	51.2 (4.9)	24.1 (3.9)	65.2 (4.3)	21.2 (3.7)
Lower Risky Sex with High Substance Use	34.1 (6.9)	44.2 (7.1)	23.0 (3.9)	79.6 (6.6)	14.0 (5.5)
Increasing Risky Sex	38.1 (5.5)	60.0 (6.2)	34.5 (6.2)	66.0 (6.0)	29.7 (5.5)
Moderate Risky Sex	36.0 (7.8)	55.7 (8.2)	19.1 (7.9)	58.6 (8.6)	20.2 (6.4)
Higher Risky Sex	<b>20.1 (5.5)</b>	<b>74.8 (6.0)</b>	32.2 (7.0)	73.6 (5.9)	<b>41.2 (6.3)</b>
<b>Males</b>					
Lower Risky Sex*	26.8 (4.2)	33.9 (5.5)	12.9 (3.1)	76.5 (4.5)	13.3 (3.1)
Lower Risky Sex with High Substance Use	38.9 (8.1)	<b>67.0 (8.9)</b>	21.3 (5.9)	88.2 (5.6)	15.7 (5.5)
Increasing Risky Sex	19.2 (5.0)	35.6 (7.4)	7.5 (3.1)	86.7 (6.3)	10.6 (3.5)
Moderate Risky Sex	18.5 (7.3)	<b>53.1 (8.0)</b>	13.8 (5.9)	80.2 (19.1)	13.2 (5.7)
Higher Risky Sex	17.7 (3.9)	<b>56.4 (6.0)</b>	17.0 (3.6)	<b>57.9 (5.1)</b>	14.3 (3.5)

\*Referent class

Means and percentages in bold are significantly different from the Lower Risky Sex class,  $p < 0.05$

Table 3.4. Health outcomes, by gender and sexual behavior latent class

	Overall health (poor - excellent, 1 to 4) Mean (SE)	# days poor physical health, past month Mean (SE)	# days poor mental health, past month Mean (SE)	# STI reported by age 24 Mean (SE)	Depression % (SE)	Alcohol abuse/ dependence % (SE)	Drug abuse/ dependence % (SE)
<b>Females</b>							
Lower Risky Sex*	3.15 (0.06)	3.45 (0.62)	4.97 (0.71)	0.52 (0.10)	13.5 (3.4)	8.6 (2.7)	8.7 (3.1)
Lower Risky Sex with High Substance Use	3.04 (0.08)	2.31 (0.64)	<b>2.89 (0.71)</b>	0.70 (0.17)	12.8 (5.4)	<b>27.8 (8.3)</b>	<b>28.3 (7.1)</b>
Increasing Risky Sex	3.07 (0.08)	3.09 (0.69)	5.66 (0.89)	<b>1.10 (0.20)</b>	19.2 (5.9)	19.8 (5.1)	<b>21.9 (5.7)</b>
Moderate Risky Sex	3.12 (0.09)	2.14 (0.68)	4.33 (1.00)	0.98 (0.24)	16.7 (8.4)	<b>38.8 (9.6)</b>	<b>42.0 (8.3)</b>
Higher Risky Sex	<b>2.74 (0.09)</b>	3.53 (0.84)	7.32 (1.14)	<b>2.10 (0.34)</b>	22.3 (5.4)	<b>53.9 (12.0)</b>	<b>56.9 (7.0)</b>
<b>Males</b>							
Lower Risky Sex*	3.22 (0.06)	0.94 (0.22)	2.22 (0.47)	0.26 (0.09)	10.2 (2.8)	21.4 (4.4)	21.4 (4.1)
Lower Risky Sex with High Substance Use	<b>3.17 (0.09)</b>	2.61 (0.83)	3.96 (1.04)	0.30 (0.14)	9.9 (4.5)	<b>47.1 (7.7)</b>	<b>55.6 (8.0)</b>
Increasing Risky Sex	<b>3.03 (0.07)</b>	<b>2.47 (0.59)</b>	2.24 (0.55)	0.16 (0.07)	11.5 (3.7)	32.8 (5.5)	27.3 (5.1)
Moderate Risky Sex	3.18 (0.10)	1.83 (0.67)	2.37 (0.82)	0.30 (0.15)	9.4 (4.7)	28.8 (7.8)	33.0 (8.3)
Higher Risky Sex	3.08 (0.07)	1.65 (0.39)	3.34 (0.65)	0.46 (0.13)	13.4 (3.5)	<b>55.7 (5.4)</b>	<b>59.8 (4.7)</b>

\*Referent Class

Means and percentages in bold are significantly different from the Lower Risky Sex class, p&lt;0.05

less likely than those in the Lower Risky Sex class to be married or engaged (20.1% vs. 44.7%), and were more likely to ever have been pregnant by age 24 (74.8% vs. 51.2%). There were no significant differences by class among women in terms of having children or current employment; however women in the Higher Risky Sex class were significantly more likely to have received public assistance at age 24 than those in the Lower Risky Sex class (41.2% vs. 21.2%). Among men, there were no significant differences by class for the likelihood of being married or engaged. Men in the Lower Risky Sex + Substance Use Before Sex, Moderate Risky Sex, and Higher Risky Sex classes were significantly more likely to have gotten someone pregnant (67.0%, 53.1% and 56.4% respectively); however there were no differences in the proportion of men in each class who reported having one or more children at age 24. Men in the Higher Risky Sex class were significantly less likely to be employed (57.9% vs. 76.5%), but there were no differences by class for the proportion of men who reported receiving public assistance at age 24.

#### *Patterns of Sexual Behavior and Health Outcomes*

Table 3.4 shows that women in the Higher Risky Sex class reported a significantly lower level of overall health status than their counterparts in the Lower Risky Sex class. Women in the Lower Risky Sex + Substance Use Before Sex class reported fewer days of poor mental health compared to those in the Lower Risky Sex class (2.89 vs. 4.97 days). Women in the Higher Risky Sex (2.10) and Increasing Risky Sex (1.10) classes reported having significantly more STIs than women in the Lower Risky Sex class (0.52). Among women at age 24, there were no differences by class in the likelihood of meeting DSM-IV criteria for depression. However, women in the Lower Risky Sex + Substance Use Before Sex, Moderate Risky Sex, and Higher Risky Sex classes were significantly more likely to meet criteria for alcohol abuse or dependence

(27.8%, 38.8%, and 53.9% respectively vs. 8.6%). Women in all of the higher risk classes were significantly more likely than those in the Lower Risky Sex class to meet criteria for drug abuse or dependence. Among men at age 24, those in the Lower Risky Sex + Substance Use Before Sex and Increasing Risky Sex classes reported significantly lower overall perceived health. Men in the Increasing Risky Sex class reported significantly more days in the past month where their physical health was poor compared to those in the Lower Risky Sex class (2.47 vs. 0.94 days). There were no differences by latent class for men in the number of STIs or in the proportion meeting DSM criteria for depression by class. However, men in the Lower Risky Sex + Substance Use Before Sex and Higher Risky Sex classes were significantly more likely to meet criteria for both alcohol and drug abuse or dependence.

## **Discussion**

This study examined differences in social and health outcomes during adulthood as a function of empirically identified classes of sexual behavior during late adolescence and young adulthood. Results suggest that discrete, longitudinal patterns of sexual behavior differentially predicted health and social outcomes for women and men at age 24.

The indicators used for this latent class analysis are all measures of risky sex. While we can try to understand healthy sexuality with these measures, the absence of risky sexual behavior is not the same as healthy sexual behavior. Future research could expand our understanding by incorporating measures that assess 'healthy' or 'normative' sexual behavior during adolescence and young adulthood. Diamond and Savin-Williams (2009) called for re-conceptualizing sexuality to include the positive emotional and physical benefits of healthy sexual behavior. (Diamond & Savin-Williams, 2009)

As expected, women estimated to be in the Higher Risky Sex class were more likely to have ever been pregnant, and males in the higher risk class were more likely to have gotten someone pregnant. Interestingly however, neither males nor females in the Higher Risky Sex classes were more likely to report having one or more children at age 24. Further examination is needed to investigate why this is the case. It may be that those with high risk sexual behavior utilize pregnancy termination at higher rates or that those in the lower sexual risk groups are planning families at younger ages. According the National Campaign to Prevent Teen and Unplanned Pregnancy, almost half of unintended pregnancies among young unmarried women end in abortion (Kaye, Gootman, Ng, & Finley, 2014). Men in the Lower Risky Sex + Substance Use Before Sex class were also significantly more likely to have gotten someone pregnant. The primary difference between this class and the Lower Risky Sex class is the proportion who reported any alcohol or drug use prior to sex. Inconsistent condom use is high in both classes, so perhaps the higher pregnancy rates among men in the Lower Risky Sex + Substance Use Before Sex may be due to less use of contraception among their partners.

Young women in the Higher Risky Sex class reported a significantly lower level of overall health, but when asked how many days in the past month their physical or mental health were poor, there were no significant differences by class, except women estimated to be in the Lower Risky Sex + Substance Use Before Sex reported significantly fewer poor mental health days than the Lower Risky Sex class. It is possible that the women in this class are self-medicating using alcohol or other drugs to minimize feelings of depression, but further research is needed to clarify this finding. As well as reporting lower perceived health overall, women in the Higher Risky Sex class were also likely to report more STIs, and to meet the criteria for alcohol and drug abuse and dependence. This pattern of findings may suggest that higher risk

sexual behaviors during young adulthood are part of an overall pattern of less-healthy lifestyle choices. This pattern of reduced overall health among those estimated to be in the Higher Risky Sex class is not as clear in the data for young men. Men in the Higher Risky Sex class did not perceive their health to be worse than those in the Lower Risky Sex class. However young men in the Higher Risky Sex class were more likely to meet criteria for alcohol and drug abuse or dependence, and were more likely to have gotten someone pregnant. While young men who were in the Higher Risky Sex class did not have lower health perceptions, some of the other indicators of physical health do suggest more health problems. These findings suggest that sexual risk reduction and general health promotion interventions can reinforce messages that safer sex behaviors, responsible alcohol use, and other healthy habits can improve overall physical health.

Young women in the Higher Risky Sex class were more likely to have received public assistance in the past year, and young men were less likely to report being currently employed than their counterparts in the Lower Risky Sex classes. Further research is needed to explain why this is—these associations may indeed be due to the higher risk sexual behaviors that perhaps lead to unintended pregnancies and the associated health and economic costs. However the mechanisms explaining this association may also be due to the effects of growing up in a lower income neighborhood and the social disadvantages related to that (Schofield et al., 2011).

Male participants reported fewer STIs overall by age 24, which may at least in part explain why membership in a higher risky sex class was not associated significantly with STIs in young men. This difference in STI rates between males and females is in line with national statistics. For example, males and females ages 20 to 24 both had the highest rates of Chlamydia of all gender age groups in 2012, but the rate of Chlamydia among females in this age group was 3,695.5 cases per 100,000, almost twice as high as the rate for males (1,350.4 cases per 100,000

males) (Centers for Disease Control and Prevention, 2013). In this study, women in the Higher Risky Sex class reported a three-fold increase in the number of STIs compared to those in the Lower Risky Sex class, and women in the Increasing Risky Sex class reported twice as many STIs. The proportion of young women estimated in the Increasing Risky Sex class who reported concurrent sexual partners and more than 3 sexual partners in the past year appeared to increase over time in this class, compared to the Moderate Risky Sex class where the proportion of women who reported having concurrent sex partners and multiple partners seemed to decrease over time. Previous research (Aral & Leichliter, 2010) has shown that concurrent sexual partners as well as multiple partners are associated with greater transmission of STI. Research has shown that young women at higher risk for STI or pregnancy are less likely to use dual contraception (i.e., condom with a hormonal contraception or intrauterine device) (Tyler et al., 2014). This suggests that preventive interventions should target reducing these behaviors especially among young women and promoting consistent condom use when they are not with a mutually monogamous partner.

Participants who reported drinking alcohol or using other drugs prior to having sex also were more likely to meet DSM-IV criteria for alcohol and drug abuse or dependence among both males and females. For both males and females, all of the latent classes that show a high proportion of members using any alcohol or drugs prior to sex also were more likely to meet criteria for alcohol or drug abuse and dependence. For example, the Moderate Risky Sex class for males does not show a high proportion of members reporting substance use prior to sex (20% at age 19) and males in this group are not significantly more likely to meet the criteria for alcohol or drug abuse than the Lower Risky Sex class. The similar class for females did show a higher prevalence of substance use prior to sex (about 74% at age 19) and women estimated to be in this

class were also more likely to meet the criteria for alcohol or drug abuse and dependence. This may suggest that any substance use prior to sex is part of a potentially problematic pattern of alcohol and other drug use, especially for young women. However, additional research is needed to determine whether any alcohol or drug use prior to sex is part of a problematic pattern, or if it is excessive alcohol use or illegal drug use that is problematic.

This study has several limitations that should be considered. The study sample was limited geographically and there were small proportions of African American, Native American, and Hispanic participants, which did not allow detailed comparisons of these groups. These participants were grouped together for analysis; although this is more inclusive, it ignores important cultural differences. Second, all of the measures were self-report. However, the sensitive questions related to sexual behavior were self-administered, which should reduce social desirability bias. Third, this study did not explore whether condoms were used consistently with long-term romantic partners vs. with more casual sexual partners. This differentiation is likely important to understanding the sexual behavior patterns of young adults and the relationship between the distinct patterns of behavior and acquiring an STI. However, membership in a higher risky sex behavior pattern did predict ever having had an STI by age 24 so even without this more nuanced understanding of condom use the classes seem to be valid. Finally, the indicators of the latent classes were measures of risky sexual behavior. Future research should include broader measures of sexual behavior to better understand what healthy sexual behavior looks like among adolescents and young adults.

Despite these limitations, this paper makes several contributions to the literature. Latent classes of sexual behavior during adolescence and early adulthood predict health and social outcomes at age 24. These findings provide important information to be considered by

prevention scientists who are interested in not only preventing STI and unintended pregnancy, but also in promoting health and positive social outcomes. Interventions promoting healthy sexuality among young adults may consider specific messaging around the increased risk for STI with concurrent and multiple sexual partners (particularly with young women). Condom use is fairly inconsistent during young adulthood, likely because other forms of contraception are being used. Specific messaging about the importance of dual contraceptive use (including consistent condom use), especially with more casual sex partners or earlier in romantic relationships, could reduce STI transmission and unintended pregnancy among this population. Another implication for prevention these findings seem to suggest is the importance of looking at the full context of young people's lives—riskier sexual behavior seems to be part of a larger lifestyle that leads to worse health and social outcomes. This means that sexual health promotion is relevant not only for improving health outcomes but also potentially for social and economic outcomes such as receiving public assistance or being employed. Finally, using alcohol or other drugs prior to sex seems to be linked with substance misuse and from previous research (Mojola & Everett, 2012; Wells, Kelly, Golub, Grov, & Parsons, 2010) we also know alcohol or drug use increases risky sexual behavior. Further research to understand the level of use and type of substance used is needed, but prevention activities to promote responsible alcohol use once young people are 21 would potentially reduce STI transmission and unintended pregnancy as well as prevent substance abuse and dependence.

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## CONCLUSION

This dissertation examined three sets of questions related to sexual behavior during adolescence and young adulthood. The first study used structural equation modeling, and found that the data supported many of the prosocial developmental paths described by the SDM. However, several paths not predicted by the SDM were also found including parental supervision predicting stronger healthy beliefs and clear standards. As hypothesized, prosocial norms and healthy beliefs and clear standards predicted more beliefs in a positive future, which was added to the model from the theory of possible selves. However, belief in the future was not associated with timing of sexual initiation, rather healthy beliefs and clear standards predicted a later age of initiation directly.

The second study used latent class analysis to identify five latent classes of sexual behavior from ages 19 to 23. The study showed that while young adult men and women exhibit similar patterns of sexual behavior, there were important differences in the levels of individual sexual risk behaviors within the behavior patterns with males showing higher levels, and in the larger proportion of males estimated to be in the Higher Risky Sex class. This study also showed that risk and protective socialization processes during adolescence impact sexual behavior during young adulthood.

Finally, the third study used the 5 latent classes of sexual behavior identified in the second study, and found that these classes differentially predict health and social outcomes at age 24. Compared to the Lower Risky Sex class, membership in the Higher Risky Sex class was associated with increased likelihood of having gotten someone pregnant or having become pregnant. For women it was associated with having received public assistance at age 24 and for men it was associated with being unemployed. Females in the Higher Risky Sex class were also

more likely to report poorer overall health and more STIs. Both males and females in the Higher Risky Sex class were more likely to meet criteria for alcohol and drug abuse or dependence. In fact, all of the classes that had a higher likelihood of using alcohol or drugs before having sex were more likely to meet criteria for alcohol and drug abuse or dependence.

These studies have several limitations. First, the sample was limited geographically, and results may not generalize to all areas. Second, although the sample was 25% nonwhite, none of African American, Asian American, Native American, Latino or mixed race subsamples had sufficient numbers to allow detailed subgroup comparisons. Rather than exclude these participants, they were grouped together for analysis. Although this strategy is more inclusive, it doesn't allow a subgroup analysis for cultural similarities and differences. Third, all of the measures were self-report. However, the sensitive questions related to sexual behavior were self-administered, which has been found to reduce social desirability bias (Schroder, Carey, & Vanable, 2003; Turner et al., 1998). Fourth, the measure of age of sexual initiation may have left and right censoring; some participants may have initiated sex before grade 8 when they were first asked, and approximately 100 participants had not reported having sex by age 24, the age of the most recent survey. Rather than excluding those participants who had not yet reported having sex we chose to cap their age of initiation at age 25, which may add bias by limiting the range of ages of initiation. Fourth, papers 2 and 3 did not explore whether condoms were used consistently with long-term romantic partners vs. with more casual sexual partners. This differentiation is likely important to understanding the sexual behavior patterns of young adults and the relationship between the distinct patterns of behavior and acquiring an STI. However, during this age group romantic relationships are often short lived (Bailey, Fleming, Catalano, Haggerty, & Manhart, 2012; Corbin & Fromme, 2002)., and membership in a higher risky sex

behavior pattern did predict ever having had an STI by age 24 so even without this more fine understanding of condom use, the classes seem to have predictive validity. Finally, the indicators of the latent classes were measures of risky sexual behavior. Future research should include broader measures of sexual behavior that go beyond understanding risky sexual behavior to better understand what healthy sexual behavior looks like among adolescents and young adults.

The results of this dissertation have several implications for practice. First, it offers some evidence for preventive interventions. Creating prosocial environments in young people's lives by providing opportunities to be involved in positive activities, rewarding them for their involvement, nurturing bonding with prosocial others, and enhancing their skills for positive interactions may lead to more prosocial beliefs and attitudes, which in turn may delay sexual initiation and reduce STIs among young people. Results of the Seattle Social Development Project suggest that changing these social developmental processes in elementary school had wide ranging effects on problem behaviors, high school graduation, pregnancy and STIs (Hill et al., 2013; Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002). Also, the finding that family and peer socialization processes are associated with young adult sexual behavior suggests that prevention programs focused on reducing risky sex should include activities to promote positive family environments and positive peer norms and relationships. Further, gaining insight into the patterns and prevalence of different types of sexual behavior over time is informative for understanding what types of health promotion messages might be most beneficial for young men and women at different ages. For example, young women were more likely than males to report having concurrent sexual partners (defined as having sex with another person while also having sex with a romantic partner) at each time point. Having concurrent partners is a strong predictor of the spread of STI's, especially true in this population given the high rate of inconsistent

condom use reported. Intervention messaging for young men and women may benefit from greater understanding of how patterns of sexual behavior increase risk for STI. Finally, the findings from the third study suggests sexual health promotion interventions should include specific messaging around the increased risk for STI with concurrent and multiple sexual partners (particularly with young women). Condom use is fairly inconsistent during young adulthood, likely because other forms of contraception are being used, so specific messaging is needed about the importance of consistent condom use. Those in romantic relationships might be specifically targeted as condom use often stops for this group despite the often are short lived nature of these relationships during this developmental period (Bailey et al., 2012). Another implication for prevention is the importance of looking at the full context of young people's lives—riskier sexual behavior seems to be part of a lifestyle that leads to worse health and social outcomes. Using alcohol or other drugs prior to sex has been linked with substance misuse and from previous research (Mojola & Everett, 2012; Wells, Kelly, Golub, Grov, & Parsons, 2010), and it increased risky sexual behavior in this sample. Prevention activities to promote responsible alcohol use once young people are 21 would potentially reduce STI transmission and unintended pregnancy as well as preventing substance abuse and dependence.

The goal of this dissertation was to better understand healthy sexual behavior among adolescents and young adults and how we can promote healthy sexuality. This goal was not fully met, in part because the measures available in the RHC study, and indeed in most or all studies addressing sexual behavior among young people, are focused exclusively on sexual risk. The absence of risky sexual behavior does not necessarily indicate healthy sexuality, and this area of research is ripe for investigation. There has been movement by large funding organizations including the NIH and CDC to begin focusing on positive sexual health, so future work should

focus on building valid and reliable measures of positive sexual health development, and begin to build our understanding of what healthy sexual behavior looks like among young people, and how we can promote healthy sexuality rather than just reduce sexual risk.. Potential measurement constructs of interest could include, for example, characteristics of healthy relationships, emotional closeness with sex partners, and sexual decision-making. In addition to identifying the need to improve our ability to assess positive sexual health, the studies in this dissertation point to the importance of teasing apart the nuances of sexual behavior decisions. For example, young men who reported always being in a relationship were more likely to be in a higher risky sex behavior class—but what does this really mean in terms of romantic relationships and risk for STI? It’s critical not only to dig deeper into how romantic relationships are defined by young men and women, but also how different types of romantic relationships may influence decisions about sex. Overall, our ability to promote positive sexual health requires us to measure constructs reflecting characteristics of healthy sexuality, and to identify the relationship, timing, and other contextual factors that influence young people’s ability to have “pleasurable and safe sexual experiences” (World Health Organization, 2006).

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**Kari M. Gloppen****Curriculum Vitae**

University of Minnesota  
 Division of General Pediatrics and Adolescent Health  
 717 Delaware St. SE  
 Minneapolis, MN 55414

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**EDUCATION**

- PhD      University of Washington      Fall 2014**  
 Dissertation: Patterns of Adolescent and Young Adult Sexual Behavior: Predictors and Consequences  
**Committee: Richard F. Catalano, PhD (Chair), Susan Kemp, PhD, Kevin Haggerty, PhD, Jennifer Bailey, PhD, & Lisa Manhart, PhD**  
 Statistical Concentration – Center for Statistics in the Social Sciences
- MPH      University of North Carolina      Conferred May 2002**  
 Concentration: Health behavior & health education
- BA      Augustana College      Conferred June 1996**  
 Majors: Psychology & Social Work, with a minor in special education

**AWARDS, HONORS & FELLOWSHIPS**

- Leadership Education in Adolescent Post-doctoral Fellow      09/2014 - Present
- Health National Institute of Mental Health (NIMH) Prevention Research Fellowship (T32MH20013)      09/2011 - 09/2014
- General exam: Passed with distinction      July 2013
- Emerging Leaders Program Participant, Department of Health & Human Services      07/2002 – 07/2004
- Academic Scholarship recipient, University of North Carolina      2000 – 2002
- Dean's list at Augustana College      1993 - 1996
- Dean's Award (Sea Education Association, Woods Hole, MA)      1994

**RESEARCH INTERESTS & EXPERIENCE****Interests**

Positive youth development, adolescent sexual health; disease prevention and health promotion; school, community, and family intervention research; research dissemination and translation; advanced quantitative methods

## Experience

**Post-doctoral Fellow, Division of General Pediatrics and Adolescent Health, Department of Pediatrics, University of Minnesota** 09/2014 – Present  
Leadership Education in Adolescent Health Grant

**Pre-doctoral analyst, Social Development Research Group, University of Washington** 10/2010 – 08/2014

Participate in the Community Youth Development Study research team.

- Involved in data cleaning, analysis (including advanced statistical methods, such as latent class analysis, survival analysis, and structural equation modeling) and writing manuscripts.

**Research assistant, Social Development Research Group, University of Washington** 3/2011 –

Participate in the Seattle Social Development research team. 6/2011

- Conducted literature reviews and assisted in data analysis.

**Research assistant, University of Washington School of Social Work** 12/2011 –

Completed Research Practicum with a multidisciplinary team

conducting a mixed methods research project entitled “Networks,

Organizational Culture, and Limited Differences: Examining the Use of Research” 8/2012

- Involved in qualitative data collection, data cleaning, analysis, conference presentation, and writing manuscript.

**Health Scientist, Centers for Disease Control and Prevention** 07/2004 –

Division of Adolescent and School Health, National Center for Chronic Disease Prevention & Health Promotion 08/2010

- Provided technical assistance to federal and non-federal partners on positive youth development strategies, youth engagement, family involvement, parenting, and other cross-cutting health promotion strategies.
- Synthesized and translated research on cross-cutting adolescent health promotion strategies.
- Coordinated the development of tools and resources that provide guidance on selecting science-based, effective health programs.
- Represented CDC on several inter-agency working groups, including the National Initiative to Improve Adolescent Health, and the Interagency Working Group on Youth Programs.

**Emerging Leaders Fellow, U.S. Department of Health and Human Services** 07/2002 – 07/2004

Participated in four rotations at divisions/offices within DHHS,

including the Division of Adolescent and School Health, Division of

Violence Prevention, Global AIDS Program (CDC, Atlanta), and the

Office of Global Health Affairs (Washington DC).

## TEACHING INTERESTS & EXPERIENCE

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### Interests

Research methods; Prevention science; Theories of human behavior and development

### Experience

**Advances in Prevention Science: Bridging the Gap from Science to Service, Lead Instructor** Spring 2014

Updated syllabus, conduct class presentation and facilitate discussion, grade assignments.

**Advances in Prevention Science: Bridging the Gap from Science to Service, Teaching Associate** Winter 2012

Assisted in syllabus development, conducted one class presentation and discussion, assisted in grading assignments.

**Mplus workshop, Co-Leader** 3/2013

Introduction to Mplus statistical software taught to social work doctoral students

## PUBLICATIONS & PRESENTATIONS

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### Peer-Reviewed Publications

**Gloppen, K. M.**, Brown, E. C., Rhew, I., Wagenaar, B., Hawkins, J.D., & Oesterle, S. (In Press). Sustaining adoption of science-based prevention through Communities That Care. *Journal of Community Psychology*.

Kim, B. K. E., **Gloppen, K. M.**, Rhew, I. C., Oesterle, S., & Hawkins, J. D. (2014). Effects of the Communities That Care prevention system on youth reports of protective factors. *Prevention Science*, Advance online publication.

**Gloppen, K. M.**, Arthur, M. W., Hawkins, J. D., & Shapiro, V. (2012). Sustainability of the Communities That Care prevention system by coalitions participating in the Community Youth Development Study. *Journal of Adolescent Health*, 51(3), 259-264.

Bouris, A., Guilamo-Ramos, V., Cherry, K., Dittus, P., Michael, S.L., & **Gloppen, K.** (2012). Parent-based interventions to prevent rapid repeat births among Latino adolescents. *American Journal of Public Health*, 102(10), 1842-1847.

Romero, L. M., Galbraith, J. S., Wilson-Williams, L., & **Gloppen, K. M.** (2011). HIV Prevention Among African American Youth: How Well Have Evidence-Based Interventions Addressed Key Theoretical Constructs? *Journal of AIDS & Behavior*, 15(5), 976-991. PMID: 20635131.

Bouris, A., Guilamo-Ramos, V., Pickard, A., Shiu, C., Loosier, P. S., Dittus, P., **Gloppen, K.**, & Waldmiller, J. M. (2010). A systematic review of parental influences on the health and well-being of lesbian, gay, and bisexual youth: time for a new public health research and practice agenda. *Journal of Primary Prevention, 31*, 273–309.

**Gloppen, K.**, David-Ferdon, C., & Bates, J. (2010). Confidence as a predictor of sexual and reproductive health outcomes for youth. *Journal of Adolescent Health, 46*, S42-S58.

Gavin, L., Catalano, R., David-Ferdon, C., **Gloppen, K.**, & Markham, C. (2010). A review of positive youth development programs that promote adolescent sexual and reproductive health. *Journal of Adolescent Health, 46*, S75–S91.

Markham, C. H., Lormand, D., **Gloppen, K.**, Peskin, M. F., Flores, B., Low, B., & House, D. (2010). Connectedness as a predictor of sexual and reproductive health outcomes for youth. *Journal of Adolescent Health, 46*, S59-S76.

### Other Publications

Centers for Disease Control and Prevention. Parent Engagement: Strategies for Involving Parents in School Health. Atlanta, GA: U.S. Department of Health and Human Services; 2012.

- Co-author

Centers for Disease Control and Prevention. Fostering School Connectedness Staff Development Program: Facilitator's Guide. Atlanta: CDC; 2011.

- Lead author

Centers for Disease Control and Prevention. School Connectedness: Strategies for Increasing Protective Factors Among Youth. Atlanta, GA: U.S. Department of Health and Human Services; 2009.

- Lead author

Centers for Disease Control and Prevention. Health Education Curriculum Analysis Tool. Atlanta, GA: U.S. Department of Health and Human Services; 2008.

- Scientific contributor

Kachur, R., Mesnick, J., Liddon, N., Kapsimalis, C., Habel, M., David-Ferdon, C., Brown, K., Gloppen, K., Tevendale, H., Gelaude, D. J., Romero, L., Seitz, H., Heldman, A. B., & Schindelar, J. (2013). *Adolescents, technology and reducing risk for HIV, STDs and pregnancy*. Atlanta, GA: Centers for Disease Control and Prevention.

### Manuscripts In Process

**Gloppen, K. M.**, Catalano, R. F., & Bailey, J. (Under review). Predicting age of sexual initiation: A theory-guided survival analysis.

## Presentations

**Gloppen, K. M.**, & Catalano, R. F. Predicting age of sexual initiation: A theory-guided survival analysis. Poster presented at 2014 Meeting of the Society of Prevention Research. May 28, 2014.

**Gloppen, K. M.**, Brown, E. C., Rhew, I., Hawkins, J. D., & Oesterle, S. Sustaining Adoption of Science-Based Prevention through Communities That Care. Paper presented at 2014 Meeting of the Society of Prevention Research. May 28, 2014.

**Gloppen, K. M.**, Brown, E. C., Wagenaar, B., Hawkins, J. D., & Rhew, I. C. Sustaining Adoption of Science-Based Prevention: Long-Term Effects of Communities That Care. Paper presented at 2014 Meeting of the Society for Social Work Research. January 17, 2014.

Kim, B. K. E., **Gloppen, K. M.**, Rhew, I., Oesterle, S., & Hawkins, J. D. Exploring Protective Factors: Did Communities That Care Make a Difference? Poster presented at 2013 Annual Meeting of the Society for Prevention Research. May 30, 2013.

Dittus, P., Michael, S., Becasen, J., **Gloppen, K.**, & Guilamo-Ramos, V. Protective Effects of Parental Monitoring Knowledge and Enforcement of Rules on Adolescent Sexual Behavior: A meta-analysis. 2013 Annual Conference of the Society for Adolescent Health and Medicine. March 16, 2013.

**Gloppen, K.**, Lindhorst, T., Herting, J., Kravitz-Wirtz, N., & Takeuchi, D. Finding the Tipping Point: Uncovering the Hidden Process of Adopting Research Evidence. 2013 Annual Conference of the Society for Social Work and Research, January 19, 2013.

**Gloppen, K.** Preventing Substance Use Among Adolescents: A Review of Positive Youth Development Programs. 2012 Biennial Meeting of the Society for Research on Adolescence, March 9, 2012.

**Gloppen K.** Exploring the Sustainability of Community-Based Interventions: Community-Level Effects of "Communities That Care" 1.5 Years Later. 2012 Annual Conference of the Society for Social Work and Research, January 14, 2012.

**Gloppen K.**, & Michael S. Building Brighter Futures: Empowering Youth, Promoting School Connectedness, and Engaging Families. American School Health Association Conference, October 29, 2009.

**Gloppen, K.** School Connectedness: Increasing Protective Factors among Youth. Presentation to graduate students at U. of Tennessee, September 10, 2009.

**Gloppen K.**, & Romero LM. Enhancing Evidence-Based HIV Prevention Interventions for African-American Youth: Addressing Gaps Through Review of the Literature. National HIV Prevention Conference, August 24, 2009.

**Gloppen, K.** Congressional Briefing on School Connectedness, Culture, and Climate. Rayburn building, June 23, 2009. Sponsored by Search Institute and National Collaboration for Youth.

Gavin, L., Catalano, R., David-Ferdon, C., **Gloppen, K.**, & Markham, C. Positive Youth Development Programs that Promote Adolescent Reproductive Health. Society for Prevention Research, May 27, 2009.

**Gloppen, K.** Partnering with Parents: A Key Strategy for Improving Both Student Health and Academic Achievement. National School Boards Association, April 6, 2009.

Gavin, L., Catalano, R., David-Ferdon, C., **Gloppen, K.**, & Markham, C. Positive Youth Development Programs that Promote Adolescent Reproductive Health. Society for Adolescent Medicine, March 27, 2009.

**Gloppen, K.**, Mueller, T., Gavin, L., & Markham, C. M. Youth Development: A Strategy to Improve Adolescent Sexual Health Outcomes. Poster presented at American School Health Conference, November 13, 2008.

**Gloppen, K.** Improving Health and Academics through Increased School Connectedness. Poster presented at National Prevention and Promotion Summit, November 27, 2007.

**Gloppen, K.** Strategies for Increasing Protective Factors among Youth: The ABCs of School Connectedness. American School Health Association, October 14, 2006.

Brindis, C., Park, J., **Gloppen, K.**, & Shea, G. The National Initiative to Improve Adolescent Health (NIIAH) in States: Successes, Challenges—How can we build support for adolescents? National Network of State Adolescent Health Coordinators Annual Meeting, April 6, 2006.

Achrekar, A., & **Gloppen, K.** The ABC's of School Connectedness. Division of Adolescent and School Health Funded Partners Meeting, January 30, 2006.

**Gloppen, K.**, & Hunt P. Choosing the Most Appropriate Health Education Curricula for School Settings. National Conference on Health Promotion and Education, May 26, 2005.

Hunt, P., & **Gloppen, K.** Improving the Health of Youth: Choosing Appropriate Health Education Curricula. National School Boards Association, April 2005.

Hunt, P., & **Gloppen, K.** Selecting Effective Health Education Curricula. AAHPERD National Convention, April 2005.

**Gloppen, K.** CDC's Consumer Guide to Health Education Curricula (Guide). Poster presented at American School Health Association, October 15, 2004.

## ADDITIONAL PROFESSIONAL EXPERIENCE

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<p><b>Health Scientist, Global AIDS Program (Botswana)</b></p> <ul style="list-style-type: none"> <li>• Assisted the GAP team in writing the 2006 and 2007 Country Operational Plans for the President’s Emergency Plan for AIDS Relief (PEPFAR).</li> <li>• Coordinated with team members and in-country partners in developing activity descriptions, and formatting it for the COPRS database.</li> </ul>	<p>08 – 10/2006 08 – 09/2005</p>
<p><b>Public Health Intern, Population Services International (Romania)</b></p> <ul style="list-style-type: none"> <li>• Conducted extensive literature review on programs on safer sex among youth, collaborated on a facilitator’s guide and curriculum, and developed an evaluation plan for the training of facilitators and curriculum program.</li> <li>• Conducted an initial reproductive health assessment in the Republic of Moldova.</li> </ul>	<p>05/2001 – 08/2001</p>
<p><b>Community Diagnosis Team Member, University of North Carolina School of Public Health</b></p> <ul style="list-style-type: none"> <li>• Analyzed primary and secondary data as part of an extensive community assessment of a neighborhood in Durham, NC.</li> <li>• Collaborated with community members to plan and facilitate a neighborhood forum to disseminate results of the assessment and facilitate a plan of action.</li> </ul>	<p>8/2000 – 5/2001</p>
<p><b>Volunteer, United States Peace Corps</b> Health education consultant in the Falesti region of Moldova.</p> <ul style="list-style-type: none"> <li>• Collaborated with Moldovan teachers to develop and implement a health curriculum for grades 6 to 11 and at the university.</li> <li>• Conducted teacher training seminars in health education topics including personal hygiene, sexuality, HIV/AIDS and STIs, smoking, alcohol and drug use prevention.</li> <li>• Wrote and received a grant to develop a community health resource center in collaboration with community members.</li> </ul>	<p>06/1997 – 07/1999</p>
<p>PROFESSIONAL AFFILIATIONS &amp; SERVICE</p>	
<p><b>Society for Prevention Research, Member</b></p>	<p>2010 – present</p>
<p><b>Society for Social Work and Research, Member</b></p>	<p>2010 – present</p>
<p><b>Peer reviewer for Journal of Adolescent Health</b></p>	<p>2013 – present</p>

