PERSONAL, ENVRIONMENTAL, & BEHAVIORAL FACTORS INFLUENCING CONDOM USE IN RURAL YOUTH

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CONDOM USE IN RURAL YOUTH**

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Background: Almost half of all high-school students in the United States have had sexual intercourse. Adolescents engaging in unprotected intercourse are at risk for pregnancy and sexually transmitted infection (STI). Although rural adolescents participate in levels of sexual risk-taking similar to that of non-rural youth, few data are available identifying factors influencing condom use among rural adolescents.

Objective: The purpose of this study is to describe and identify personal, environmental and behavioral factors that predict condom use in rural youth in grades 9-12.

Method: A descriptive, correlational, comparative, cross-sectional survey was conducted in a high-school setting among adolescents (N=613), ages 13-19, in three rural school districts in the Northeast. Correlational analyses were used to examine associations among variables, logistic regression analyses were used to identify predictors of the outcome variable (high goals for condom use among all youth; condom use among sexually active youth).

Results: Predictors of condom use among sexually active youth included personal standards for condom use (Odds Ratio [OR] = 2.45; 95% Confidence Interval [CI] 2.39-6.47), condom use goals (OR = 1.32; CI 1.21-1.45), condom use at first intercourse (OR = 3.93; CI 2.39-6.47) and male gender (OR = 3.17, CI 1.93-5.21) while increasing age (OR = .78, CI .63-.96) and the use of non-condom contraception (OR = .54, CI .32-.89) reduced the likelihood of condom use.

Predictors of those having high goals for condom use among all rural youth include personal condom use standards (OR = 9.522; CI 6.46-14.01), self-efficacy for communication about condom use (OR = 2.182; CI 1.40-3.38), self-efficacy for refusing unwanted intercourse (OR = 1.379, 1.02-1.85), and norms for condom use (OR = 1.82; CI 1.38-2.39).

Conclusion: Fostering high goals for condom use and personal standards for condom use appear to predict actual condom use in this sample of rural adolescents. Interventions aimed at increasing condom use among rural youth could include focused strategies to target these predictors. Interventions delivered prior to the initiation of intercourse are likely to provide the greatest impact given the predictive nature of age and condom use at first intercourse.

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1.0   INTRODUCTION

1.1   BACKGROUND AND SIGNIFICANCE

Engaging in sexual activity provides opportunity for exposure to the potentially negative consequences of sexual intercourse, specifically unintended pregnancy and sexually transmitted infection (STI). Almost half of all high-school students in the United States have had sexual intercourse (Centers for Disease Control and Prevention [CDC], 2010a). While trends reveal a decline in risk-taking behavior since the early 1990's, rates of sexual activity and condom use have been relatively stagnant for more than half a decade (CDC, 2010b; Mulye et al., 2009; Santelli, Orr, Lindberg, & Diaz, 2009). Teen birth rates have risen nationally with a 5 percent increase noted from 2005 to 2007 (Martin, et al., 2010), as reflected by the 451,091 children born to teen mothers in 2007(CDC, 2010c). Approximately 19 million new STIs occur each year (CDC, 2009a). Representing one fourth of the sexually active population, adolescents account for almost half of all new STIs (Weinstock, Berman, & Cates, 2004), with one in four young women between the ages of 14 and 19 infected with at least one of the most common STIs (Forhan, et al., 2009). These infections increase the risk for acquisition of other STIs, including the human immunodeficiency virus (HIV) and place the adolescent at risk for long-term complications of STIs, including pelvic inflammatory disease (PID), infertility, cervical cancer,

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and chronic pelvic pain (CDC, 2009a; Cates, 2004). The costs associated with teen pregnancy and STI total more than 30 billion dollars annually (Hoffman, 2006; Schackman et al., 2006; Institute of Medicine [IOM], 1997).

Condoms are widely recognized to decrease transmission of STI and reduce the occurrence of pregnancy. Promoting responsible sexual behavior, which includes condom use, is identified as a leading health indicator by *Healthy People 2010* (U.S. Department of Health & Human Services [HHS], 2000) and continues to be included in the priority objectives for *Healthy People 2020* (HHS, 2010). When examining rural youth, it has been noted that they are often more sexually active (Milhausen et al., 2003), engage in intercourse earlier, use condoms less frequently (Hensel & Anderson, 2006; Milhausen et al., 2003) and are twice as likely to have a history of pregnancy during adolescence as suburban youth (Atav & Spencer, 2002), with many rural communities commonly reporting higher than average rates of adolescent pregnancy (Mueller, Nicola, & Hill, 2010; Roberto, Zimmerman, Carlyle, & Abner, 2007; Bennett, Skatrud, Guild, Loda, & Klerman, 1997). When coupled with high levels of poverty (U.S. Department of Agriculture [USDA], 2004) and disparate access to healthcare (Agency for Healthcare Research and Quality [AHRQ], 2005), the socioeconomic burden and negative health consequences of teen pregnancy and childbearing may be more strongly felt in the rural community.

Rural areas are negatively affected by HIV and other STIs. The number of persons with HIV infection or AIDS continues to rise in rural communities with some rural areas reflecting rates similar to those reported in urban areas (Hall, Li, & McKenna, 2005). Additionally, rural Appalachian women have been shown to have a statistically higher incidence of invasive cervical cancer and death than the general population (Hopenhayn, King, Christian, Huang, & Christian, 2008; Hopenhayn, Bush, Christian, & Shelton, 2005). This preventable cancer is

caused by the sexually transmitted human papilloma virus (HPV), an STI whose incidence is highest during adolescence (Workowski & Berman, 2006). When condom nonuse and exposure to STIs are paired with the limited healthcare services often found in rural communities, the risks for rural adolescents are magnified (Anderson & Gittler, 2005; Elliott & Larson, 2004).

The success of prevention programs has been linked to the degree to which they are tailored to the target population (DiClemente et al., 2008; Sales, Milhausen, & DiClemente, 2006). Comparatively little is known about the prevalence of risk-taking behaviors or the personal characteristics that influence sexual behavior in rural youth (Rural HIV/STD Prevention Workgroup [RCAP], 2009; Wewers, Katz, Fickle, & Paskett, 2006; Fahs et al., 1999). Attempts at applying effective interventions designed for urban youth had limited success in the rural setting (Stanton et al., 2006; Hubbard, Giese, & Rainey, 1998). To more efficiently design and/or transfer interventions aimed at promoting responsible sexual behavior and increasing condom use in rural youth, more information about the characteristics of condom use in this hard to reach adolescent population is needed. This study will serve as the foundation for a program of research focusing on increasing the depth of theoretically derived knowledge and empirical evidence that can be applied to reducing the sexual risk-taking behaviors of rural adolescents in an effort to decrease teen pregnancy and limit the incidence of sexually transmitted infections in resource poor rural communities.

1.2   PROBLEM STATEMENT

1.2.1   Purpose

The **purpose** of this study is to identify and describe personal, environmental and behavioral factors that predict condom use in rural youth in grades 9 through 12. By examining factors related to condom use identified as *personal factors* (demographics, knowledge, self-esteem, perceived risk, personal standards, self-efficacy, condom use barriers and condom use goals), *environmental factors* (social norms, parental communication, and social support) and *behavioral factors* (substance use, sexual history), limitations of the current literature are addressed and information is provided to reduce gaps in the existing body of evidence and provide a more complete understanding of condom use among rural high-school aged youth

1.2.2   Specific Aims

The primary aims of this study are: 1) To describe the personal, environmental, and behavioral factors related to condom use in sexually active rural youth; 2) To compare differences in the personal, environmental, and behavioral factors of sexually active rural youth who currently use condoms and those who do not; and 3) To examine associations among the personal, environmental, and behavioral factors and to identify predictors of condom use in sexually active rural youth.

The secondary aims of this study are: 1) To compare differences in the personal, environmental, and behavioral factors among all rural youth; and 2) To examine the associations among the personal, environmental and behavioral factors and to identify predictors of personal condom use goals in rural youth.

1.3   THEORETICAL FRAMEWORK

While this study does not aim to test a theory, Bandura's Social Cognitive Theory (SCT) (Bandura, 1986) and Lerner's Contextual Model of Adolescent Development (Lerner, 1992) provide the theoretical and contextual framework guiding this theory driven study. Bandura's SCT has been widely used in research related to health promotion, including sexual risk reduction and condom use. Recognized as one of the most consistently used theories in STI/HIV prevention interventions, SCT is identified as a foundational element in many programs aimed at reducing sexual risk-taking and promoting condom use in diverse populations (Kirby, Laris, & Rolleri, 2006b; Albarracin et al., 2005). Expanding the application of SCT in the field of HIV and AIDS prevention specifically, Bandura penned *Perceived self-efficacy in the exercise of control over AIDS infection* (Bandura, 1990) and *Social Cognitive Theory and exercise of control over HIV infection* (Bandura, 1994).

Bandura contends that the domains of person, environment, and behavior interact in a reciprocal manner to influence current and future behavior (Figure 1). From the perspective of SCT, people are not simply products of their environment or exclusively driven by instincts or personal traits beyond their control (Bandura, 1978). Reciprocity is not conditional on the

strength or symmetry of the influence observed between factors and may vary dependent on circumstance (Bandura, 1986). Among these reciprocal processes, interactions within each domain may provide additional influence.
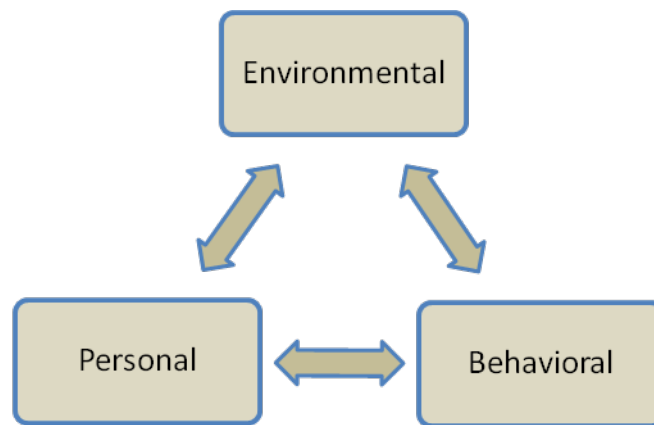
Figure 1   Bandura's representation of triadic reciprocity in Social Cognitive Theory[Bandura, 1986)

Consistent with these views, the primary aims of this descriptive, correlational, comparative study are to examine the personal, environmental, and behavioral factors that influence condom use among sexually active rural high school students using selected variables derived from the core concepts of SCT and drawn from the existing literature. Figure 2 depicts the selected variables for this study. The secondary aims examine the relationships between and among the variables as they relate to the goals for condom use among rural high school students (Figure 2-highlighted portion only).
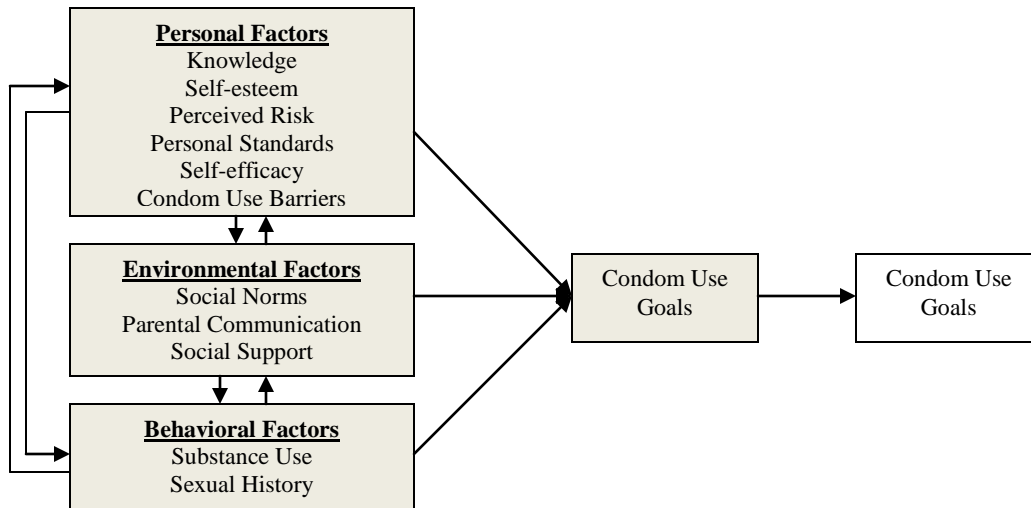
Figure 2 Application of Bandura's Social Cognitive model of triadic reciprocity

While triadic reciprocity is viewed as a fundamental element of SCT, Bandura (2004) has further outlined six core determinants that can be used in the evaluation and analysis of behavior as well as in the development of health promotion efforts aimed at behavioral change. These core determinants include knowledge, perceived self-efficacy, goals, outcome expectations, perceived facilitators and impediments. Bandura (1994) notes that *knowledge*, in the form of factual information, is rarely powerful enough to elicit behavior change without the presence of additional influences. Self-efficacy, the personal belief in the ability to control one's own actions to produce a desired outcome despite the presence of potential obstacles, has been identified as a fundamental aspect contributing to individual motivation and subsequent action (Bandura, 1978). When an individual possesses both knowledge and *self-efficacy*, the likelihood of participating in protective health behaviors is increased (Bandura, 1986).

Bandura argues that human behavior, for the most part, is purposive and regulated by forethought (Bandura, 1989). Goals are formed to reflect intention for behavior (Bandura, 2004). In the SCT *goals* help to predict behaviors by providing motivation and helping to shape action. In the context of this study, condom use goals are therefore likely to predict condom use. Other motivations for behavior rely strongly on the individuals anticipated *outcome expectations*. In general, people tend to engage in behaviors to achieve an anticipated benefit or prevent negative reactions. Outcome expectations can be based on either actual outcomes from prior experience or anticipated responses to a given behavior based on prior observations or social norms (Bandura, 1986). The anticipated outcome expectations can be *social* in nature such as disapproval from friends or a significant other for acting outside of the normative constraints identified by the peer group or conversely, increased popularity and social status; *physical* such as the perceived risk of a behavior expressed as worry or concern over the risk of pregnancy or acquisition of a STI or a more positive expectation of pleasure; or *self-evaluative,* reflecting a personal internal standard of behavior (Bandura, 2001). Other internal and external influences take the form of *facilitators* or *impediments,* which either foster or encourage behavior or serve to inhibit participation in a given behavior. Recognizing that interpersonal relationships must be considered in matters of sexuality (Bandura, 1994), supportive relationships and open communication may be viewed as facilitators of condom use while fear of exposure and embarrassment may act as impediments, reducing the likelihood of condom use.

Containing constructs viewed as complementary to those found in SCT, Lerner's theory of developmental contextualism is based on two fundamental concepts (Lerner, 1992). The first is the premise that factors influencing adolescent development exist on several qualitatively distinct levels. The second is the view that these coexisting influences are reciprocal in nature.

This concept of the dynamic interactions within developmental contextualism allows for the understanding that it is these relationships among and between levels, this synthesis of influence, which shapes the developing adolescent. Adolescent development must therefore be considered in terms of not only biological and psychosocial influence, but within the larger external context (Lerner, 1992). This external context includes a variety of interpersonal, institutional, and cultural influences (Lerner & Galambos, 1998).

In this study, the rural community and rural culture are recognized to be two distinct levels of influence that impact the developing adolescent (Figure 3). While the rural community can be identified simply as a group of people living within the identified geographic borders of a rural area (Agnes, 1999); rural culture broadly encompasses the ideas and customs passed down through generations that are considered to be unique to individuals residing in a rural community (Agnes, 1999). As outlined by Lerner (1992), the contextual influences of the rural community in concert with the rural culture serve to influence the developing individual throughout the lifespan. Therefore, the rural culture shapes not only the characteristics of the community but also the characteristics of the individuals within the community. Due to the reciprocal nature of the personal and biological characteristics of each adolescent and the subsequent interaction with external variables such as peer groups, family members and other contextual influences, this pattern of interaction creates unique differences in the developing rural adolescent that may not be observed in adolescents residing in non-rural environments.

Developmental contextualism also stresses the relative plasticity of the adolescent. Lerner defines plasticity as the potential for change throughout the period of development (Lerner, 1992). Considering this relative plasticity across the lifespan, changes at any organizational level may be either a product of change or a producer of change across or within

other levels (Lerner, 1996). Within this worldview, the probability for behavior change is likely to exist at differing stages of development. Given these dynamic interactive processes behavior change may be possible through the creation of interventions directed toward altering the interactive levels, singularly or in combination, within which the individual is enmeshed.
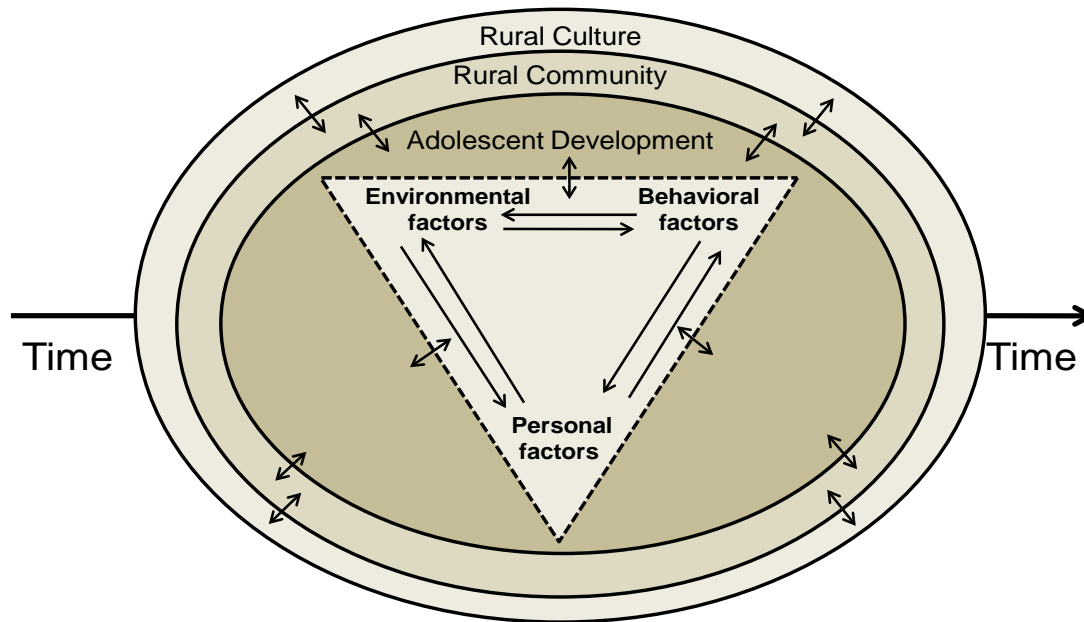
Figure 3 Theoretical model combining concepts from Bandura's SCT and Lerner's Developmental Contextualism reflecting the adolescent's perception of the personal, environmental, and behavioral factors within the context of adolescent development in a rural setting.

Key: Concentric rings represent the qualitatively distinct levels of influence in the rural setting. Bi-directional arrows represent the reciprocal influence between external and individual factors. The central triangular line represents the intrinsic individual perception of key study variables which may influence current and future behavior. The triangular line is not solid to reflect the plasticity of the individual within the context of Adolescent development in a rural setting. The horizontal line represents the temporal nature of change.

Rural: Loosely defined, rural is "living in the country" (Agnes, 1999, p. 1257). For purposes of this study rural areas are defined in a manner consistent with the Center for Rural Pennsylvania's (CRP) definition of a county or school district that contains fewer than 274 persons per square mile (CRP, 2010).

Adolescent: Adolescent may be defined as "a boy or a girl from puberty to adulthood; a teenage person" (Agnes, 1999, p. 18). For the purposes of this study an adolescent is defined as any individual who reports to be currently age 13-19 on a single question on the Demographic form.

Personal factors: Personal is "of or peculiar to a certain person; individual" (Agnes, 1999, p. 1074). For purposes of this study, personal factors are defined as personal characteristics such as age, gender, and race as well as the individual's knowledge, level of self-esteem, perceived risk, personal standards, perceived self-efficacy, condom use barriers and condom use goals.

Demographics: Identified as the "characteristics of a population" (Agnes, 1999, p. 384). For the purposes of this study, demographic characteristics for the independent variables of age, grade level, gender, and race were identified by individual items on the Demographic Form. Additional demographic information was gathered in for purposes of describing the sample. These additional characteristics include academic performance as identified by grades earned in school, level of parental education and family members living in the participant's household.

Knowledge: Knowledge is recognized to be necessary for behavioral health change. Without knowledge of how our behavior affects health there is little reason for altering habits that are enjoyable (Bandura, 2004). Knowledge may be defined as an "acquaintance with facts; range of information, awareness, or understanding" (Agnes, 1999, p. 793). Consistent with this definition, knowledge is defined for the purposes of the study as a factual understanding of information relative to condom use and STI transmission as measured by fifteen items adapted from the *Sexual Risk Knowledge Scale* (Shrier et al., 2001). Higher summative scores are considered to reflect a higher level of knowledge.

Self-esteem: Bandura (1986) writes that while self-esteem and self-efficacy are distinctly different phenomena, often individuals cultivate self-efficacies in things that give themselves an increased sense of self-worth. Self-esteem is a measure of self-worth. Self-esteem may be defined as reflective of a person's "view of his or her accomplishments and capabilities, and values and perceived success in living up to them, as well as the ways in which others view and respond to that person" (VandenBos, 2007, p. 830). Increases in self-esteem result from a more positive collective perception of these qualities. For the purposes of this study self-esteem is defined as a perception of global self-worth as measured by 10 items contained in the Rosenberg Self-esteem Scale (Crandal, 1973) with higher summative scores reflecting higher levels of perceived self-esteem.

Perceived Risk: Theoretically, perception of risk, perceived threat, perceived susceptibility, and negative physical outcome expectations are overlapping constructs represented in commonly used behavioral theories (Bandura, 2004). Worry is identified to be a component of these theoretical constructs (Crosby et al., 2001). Worry is defined as "a state of mental distress or agitation due to concern about an impending or anticipated event, threat, or

danger" (VandenBos, 2007, p. 1004). For purposes of this study, perceived risk is defined as frequency of expressed worry about the real or potential acquisition of HIV, STI, or unintended pregnancy as measured 10-item adapted from the *Worry About Sexual Outcomes* (WASO) *scale* (Sales et al., 2009). Higher summative scores are considered to reflect a higher level of worry and therefore an increased perception of risk.

Personal standards: Bandura (1986) identifies that personal standards act to regulate behavior through the process of self-evaluation and censure. The construction of personal standards is reflective of our beliefs and values about how we should act in a given situation. Cognitive in nature and formed through interactions with the environment, they reflect personal judgments of appropriate behavior. "Goals and standards serve as cognitive representations of desired futures" (Bandura, 1986, p. 233). In navigating sexual safety, it is recognized that "self-regulation operates [partially] through internal standards" (Bandura, 1990, p. 10) to limit individual risk-taking. For the purposes this study, personal standards for condom use and sexual behavior represented by the expression of the individual's view of appropriate behavior for a given circumstance are measured by six items contained in the *Sexual Risk Behavior Beliefs and Self-efficacy scales* (Basen-Engquist et al., 1999). The six items consist of three items reflective of condom use and three items reflective of sexual activity, which share the common stem "I believe that…"

Perceived self-efficacy: Self-efficacy is defined as a person's belief in their ability to produce a desired result through control of their actions (Bandura, 1986). Bandura argues that the construct of self-efficacy must not simply be assessed as a measure of confidence but the belief of personal ability in the presence of potential obstacles to successful execution of a desired behavior (Bandura, 1994). For purposes of this study, self-efficacy includes the

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adolescent's confidence in their ability to refuse unwanted sex (three items), communicate with a sexual partner about condom use (three items), and their confidence in the ability to correctly obtain and use a condom during sexual intercourse within a given situation (three items) measured by nine questions in the *Sexual Risk Behavior Beliefs and Self-efficacy scales* (Basen-Engquist et al., 1999), with higher summative scores indicating greater levels of self-efficacy.

Condom use barriers: Theoretically a barrier is consistent with the impediments outlined by SCT (Bandura, 2004), something which prevents behaving in a desired manner either real or imagined. For purposes of this study, condom use barriers are defined as something real or imagined which prevents condom use as identified by three items on the *Sexual Risk Behavior Beliefs and Self-efficacy* (SRBBS) *scales* (Basen-Engquist et al., 1999), with higher scores reflecting increased barriers to condom use.

Condom use goals: Goals can be defined as "an end that one strives to attain" (Agnes, 1999, p. 607). Bandura (2004) says that theoretically defined, short term goals are synonymous with intentions for a given action. For purposes of this study, the intention to use condoms is a short-term goal for condom use in a specified manner with a specified person as measured by five items on the *Intentions to Use Condoms* scale (Delaney, Langille, Richardson, & Beazley, 1997). Higher summative scores reflect increasing goals for condom use.

Environmental factors: Environmental factors are considered to be external influences (Baranowski, Perry, & Parcel, 2002). For purposes of this study, environmental factors are defined as social norms, parental communication and social support.

Perceived social norms: Theoretically identified to be synonymous with social outcome expectations (Bandura, 2004), norms may be defined as "a standard of conduct that should or

must be followed; a way of behaving typical of a certain group "(Agnes, 1999, p. 984). For the purposes of this study, perceived social norms therefore are the participant's perceptions of social pressure to behave in a certain manner. This social approval or disapproval is considered an outcome expectation, which may help to regulate personal behavior. Norms are measured using questions contained in the *Sexual Risk Behavior Beliefs and Self-efficacy scales* (Basen-Engquist et al., 1999) including three items related to norms for sexual intercourse and three additional items assessing norms for condom use. All six items assessing norms share the common stem "Most of my friends believe…" to reflect the participants' perception of normative conduct.

Parental Communication: Parent-adolescent sexual communication is defined by Sales et al. as the "frequency of any communication between adolescents and their parent(s) about topics related to sexual safety in general and specifically, methods of protection against STIs, HIV, and pregnancy"(2008, p. 333). The level of parent-adolescent communication is identified and measured by responses to five items adapted from the *Parent-Adolescent Communication Scale* (Sales et al., 2008). Higher scores indicate higher levels of parent-adolescent communication about sexual health topics.

Perceived social support: Procidano and Heller define perceived social support as "the extent to which an individual believes that his/her needs for support, information, and feedback are fulfilled" (1983, p. 2). These perceptions are felt to play a significant role in normal adolescent development and may be predictive of resiliency in rural youth (Markstrom, Marshall, & Tryon, 2000). The perception of social support is defined for purposes of this study as the extent to which the adolescent is able to identify the receipt of support and caring from social network of family members, friends, or a significant other as measured by the 12 items contained

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in the *Multidimensional Measure of Perceived Social Support* (Zimet, Dahlem, Zimet & Farley, 1988). Three separate areas of perceived social support (friends, family, and significant other) have been assessed with higher mean scores reflecting higher levels of perceived support.

Behavioral factors: Behavior is defined as a "pattern of observable actions" (Agnes, 1999, p. 131). For purposes of this study, behavioral factors are defined as substance use, specifically alcohol or drug use, sexual intercourse, sexual history which includes the number of sex partners, the age at first coitus, the concurrent use of contraception at last intercourse and condom use.

 Substance use: Behaviors that contribute to increases in morbidity and mortality may be considered health risk behaviors (CDC, 2010a). For purposes of this study substance use is defined as the ingestion or inhalation of a specified substance. Substances included in this definition are alcohol, marijuana, methamphetamines, cocaine, glue or aerosol inhalants, non-prescription steroids, and prescription drugs taken without a prescription. Alcohol use is measured by two items, "How old were you when you had your first drink of alcohol other than a few sips?" and "During the past 30 days, on how many days did you have at least one drink of alcohol?" Drug use is measured by six items evaluating the use of marijuana, cocaine, inhalants, steroids, methamphetamine and use of a prescription drug without a prescription. The use of substances, specifically alcohol and drugs, has been identified to be closely associated with sexual risk-taking in some adolescents populations (Tapert, Aarons, Sedlar, & Brown, 2001). Therefore, combined health risk behaviors (intercourse & substance use) will be assessed by a single item: "Did you drink alcohol or use drugs before you had sexual intercourse the last time".

 Sexual Intercourse: Sexual intercourse is defined for the purposes of this study as penetrative genital contact. As sexual preference is not identified by the study participants, no

differentiation will be made between vaginal and/or anal intercourse. Other methods of sexual intercourse such as oral-genital intercourse are not included in this definition. For the purposes of this study, sexual intercourse is measured by a single dichotomous item "have you ever had sexual intercourse?"

Sexual History: Sexual is identified as involving or associated with sex, specifically intercourse (Agnes, 1999) while history has been defined as "an account of what has or might have happened"(Agnes, 1999, p. 676). Sexual history therefore is defined as previous activities associated with sexual intercourse, specifically the number and timing of sexual partners and non-condom contraceptive use. Multiple sexual partners and early engagement in sexual intercourse increase the risk of STI acquisition (Workowski & Berman, 2006). Multiple sexual partners are defined for the purposes of this study as four or more sex partners. The overall number of sexual partners will be assessed by a single item, "During your life, with how many people have you had sexual intercourse?" Early coital debut is defined for the purposes of this study as those who engage in intercourse at or before the age of 14 as assessed by a single item, "How old were you when you had sexual intercourse for the first time?" The possibility of non-condom contraceptive use at last sex will be identified by the single item, "The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?" For the purposes of this study, condom use will be considered separately as the dependent variable of interest.

Condom Use: The male condom is a latex, lambskin, or polyurethane sheath for the penis that is worn for sexual activity. The correct application of a condom provides a mechanical barrier that limits exposure to body fluids and infective organisms for both partners. Condoms therefore act to reduce the potential spread of many STIs (Holmes, Levine, & Weaver,

2004) and help to limit the occurrence of pregnancy. Condom use may be defined as the application of a male condom to the penis for an act of sexual intercourse. The use of the female condom will not be included for the purposes of this study as its use is limited in the adolescent population. Actual condom use at last intercourse will be measured by a single dichotomous item, "The last time you had sexual intercourse did you or your partner use a condom?" while prior condom use will be assessed by the item "The first time you had sexual intercourse did you or your partner use a condom?" Frequency of condom use will be assessed by the item "How often do you and your sexual partner(s) use a condom when you have sexual intercourse?" using a five point likert-type response (1=Always, 5= Never).

1.5   INNOVATION AND SIGNIFICANCE TO NURSING

The study is considered to be innovative because it a) addresses the needs of rural youth, who are underrepresented in the current literature and may be more strongly affected by the negative consequences of sexual activity, specifically STI and teen pregnancy, due to disparate access to healthcare and high levels of poverty frequently found in rural communities; b) is driven by a strong theoretical framework that addresses not only the determinants of behavior as identified by Bandura's Social Cognitive Theory but also the contextual influence of adolescent development within the rural setting as described by Lerner; and c) investigates condom use as a dependent variable of interest among rural high-school adolescents using a unique constellation of personal, environmental, and behavioral variables previously unreported in the current literature.

The study is significant because of a) the limited information currently available related to the factors influencing condom use in rural high-school aged youth; b) the need for identified predictors of condom use to guide the construction of evidence based interventions designed specifically for rural youth; c) the underrepresentation of rural youth in research directed toward reducing sexual risk-taking despite high levels of risk-taking behavior in this population; and d) the magnification of negative consequences faced by rural youth who engage in sexual activity due to the lack of available healthcare resources in rural areas, reduced access to care due to transportation and fiscal barriers found in the rural setting, and the lack of acceptability for youth seeking reproductive health services in conservative rural communities.

Nursing efforts aimed at condom promotion to limit STI among rural youth may be effective for reducing the elevated rates of teen pregnancy commonly found in the rural setting. However, a better understanding of the predictors of condom use among rural high-school aged youth is needed in order to design or adapt effective interventions for this population. The information gathered by this research project will add to the depth of knowledge in the field and provide additional evidence which may be used when designing or adapting interventions aimed at increasing condom use as a means for limiting teen pregnancy and STI transmission among rural adolescents.

2.0   LITERATURE REVIEW

2.1   OVERVIEW

The literature is divided into three major sections relevant to the study in order to accurately reflect the state of the science and highlight gaps in the current knowledge related to adolescent condom use.   The three areas are rural populations, rural adolescents, and rural adolescent condom use.   The area of rural adolescent condom use has been further divided into personal factors, environmental factors, and behavioral factors influencing condom use.

2.2   RURAL POPULATIONS

The most recent decennial census data indicate that more than 59,000 people, 21% of the U. S. population live in rural areas (U.S. Census Bureau, 2012). In defining rural, multiple characterizations exist depending on the impetus for the specification (Cromartie & Bucholtz, 2008). Cordes (1985) posits that low population density most appropriately defines rural.   In a U.S. Census Bureau project, rural areas were defined simply as "all territory not within an urban area" (U.S. Census Bureau, 2009). The White House's Office of Management and Budget, the U.S. Department of Agriculture's Economic Research Service, and the Pennsylvania Office of

Rural Health each defines rural differently using distinct criteria. These differences may confound the epidemiologic quantification of behavior or illness among rural residents, thereby limiting the availability of data by level of urbanicity at the national level.

While rural communities are undeniably diverse, many features are common to rural living. Rural areas frequently score lower on key measures of health when compared to urban or suburban areas (Eberhardt & Pamuk, 2004). Issues of availability, access and acceptability underlie many reported healthcare disparities. With only nine percent (Agency for Healthcare Research and Quality [AHRQ], 2005) of physicians serving the more than 20 percent of U.S. residents living in rural regions, disparate access to health care services including social programs and mental health services is common (Anderson & Gittler, 2005; Puskar & Bernardo, 2002). Rural communities are often geographically and socially isolated with elevated rates of poverty (USDA, 2004; Seekins, 2002). Lack of access to transportation including public transportation may further limit the utilization of services due to the increased geographic distances between necessary resources in areas of low population density (Arcury et al., 2005; Arcury, Preisser, Gesler, & Powers, 2005).

Rural nurses and healthcare providers face unique social and cultural challenges impacting care delivery (Puskar, Tusaie-Mumford, & Boneysteele, 1996) and the quality of care provided (Dharmar et al., 2008). Economic constraints and differing community priorities in rural regions may not allow for the expansion of health education services, including safer sex messages (RCAP, 2009). For rural teens seeking reproductive healthcare, lack of confidentiality and privacy, presence of intertwined social networks, increased stigma and community gossip, the potential impact on personal reputation due to discovery, and lack of access to family

planning services present additional barriers (Noone & Young, 2009; Garside, Ayres, Owen, Pearson, & Roizen, 2002).

Rural areas are impacted by STI and HIV. In an analysis from the CDC requested by the RCAP, rates of chlamydia and gonorrhea infection among rural dwellers were found to be 312 per 1000,000 and 78 per 100,000, respectively, as of 2008 (Dreisbach, 2011). These rates are not very different from rates of chlamydia and gonorrhea in more urban regions which are 412 per 100, 000 and 117 per 100,000, respectively. In addition, approximately 26,154 rural adolescents and adults are currently living with AIDS and an additional 17,192 have been diagnosed with HIV (CDC, 2008). Stigma associated with STIs and HIV can be quite widespread within the rural setting (RCAP, 2009) with many rural residents denying that these issues exist in their community (Foster, 2007).   This may cause those who are at risk to delay or forgo seeking information related to prevention or treatment. For those with HIV, the risk of HIV related mortality is increased in rural areas (Lahey et al., 2007). Diagnosis of HIV infections frequently occurs later in rural areas with almost half of those diagnosed advancing to AIDS within one year (Gay, Napravnik, & Eron, 2006). Although HIV/AIDS may be less prevalent in many rural areas, the medical and social services required by affected individuals may exponentially burden rural health providers (Steinberg & Fleming, 2000).

Rural settings present formidable barriers to the introduction of sex education programs and research. These barriers include increased moral and religious conservatism (D'Allesandri et al., 2003; Stanton et al., 2005), the perception of reduced STI risk (Smith & DiClemente, 2000), and an insider/outsider perspective which engenders distrust of efforts from outside parties (Bell et al., 2007). Much of what we know about condom use among rural adolescents has been derived from secondary analyses of nationally representative samples. Unfortunately, the

frequent use of subsamples in these studies may undermine the representativeness of the sample with regards to urbanicity (Dye & Upchurch, 2006; Henrich, Brookmeyer, Shrier, & Shahar, 2006; Rosenbaum, 2009; Shafii, Stovel, & Holmes, 2007). Although rural dwellers frequently report lower levels of condom use (Atav & Spencer, 2002; Hensel & Anderson 2006; Milhausen et al., 2003; Tobar et al., 2009) despite similar levels of sexual risk-taking (Yarber, Milhausen, Crosby, Graham, & Sanders, 2008), the majority of research examining condom use and sexual risk reduction continues to be conducted in urban populations. For studies recruiting participants from both rural and urban areas, the proportion of rural participants is seldom specified, and rural/urban comparisons are rarely included in the analysis (Rosenthal, Moore, & Flynn, 2006; Caron, Godin, Otis, & Lambert, 2004; Kirby, Barth, Leland, & Fetro, 1991).

Replications of evidence-based programs are reported to be most effective when delivered as designed to populations that are similar to the original population (Kirby, Laris, & Rolleri, 2006a). While attempts are being made to adapt a small number of prevention programs for rural youth, evidence of the efficacy of these programs is lacking (Dreisbach & Moyer, 2008). Implementation of programs that aim to reduce STI or teen pregnancy can be challenging for rural communities. Many rural communities are not open to providing education for STI/HIV risk reduction and may severely limit the content of interventions (Ott, Rouse, Resseguie, Smith, & Woodcox, 2011). Even small changes, such as the omission or substitution of activities deemed inappropriate in conservative communities or changing the number of sessions offered to accommodate transportation issues, may negatively impact the intervention (Stanton et al., 2005; Stanton et al., 2006) and its ability to effect observable changes in behavior. This underscores the idea that more information is needed to identify predictors of condom use in the rural setting to create interventions specifically for rural adolescents.

2.3   RURAL ADOLESCENTS

Those less than 20 years old comprise 29.1% of the rural population, a slightly higher percentage than the 28.6% reported to be living in urban areas (The White House, 2010). Adolescence is a period of rapid biologic, emotional, psychosocial, and intellectual growth and change (Lerner, 1992). The period of adolescence is characterized by curiosity and experimentation as individuals attempt to establish their place in society outside the family unit and establish a sexual identity (Lerner, 2002). Rural adolescents may face an accelerated transition from adolescence to adulthood (Crockett, 1997). During this period adolescents are influenced by family, friends, and the larger community to participate in behaviors that may impact their current and future health (National Center for Chronic Disease Prevention and Health Promotion, 2010). The attitudes and beliefs developed during adolescence are likely to become established patterns of health behavior, making this period an ideal interval for health promotion (Doswell & Braxter, 2002).

Adolescents frequently engage in sexual activity prior to acquiring the cognitive and social maturity necessary to deal with the potential consequences of these actions (Gilligan, Kohlberg, Lerner, & Belenky, 1971). Rural adolescents are identified to engage in significantly higher levels of sexual activity than their urban or suburban counterparts (Atav & Spener, 2002). Underscoring the need for early intervention, 75% of college students (Buhi, Marhefka, & Hoban, 2010) and almost half of all high-school students (CDC, 2010a) report being sexually active.

Adolescents are disproportionately affected by the negative outcomes associated with sexual activity. In 2006, an estimated three-quarters of a million teen pregnancies occurred, with

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approximately 15,000 pregnancies in girls age 10-14 (Kost, Henshaw, & Carlin, 2010). The teen birth rate among those aged 15-19 is currently 41.5 per 1000 women, a rate substantially higher than that found in many Western countries (Martin, et al., 2010), with rural dwellers often reporting higher levels of teen pregnancy than those in non-rural areas. For example, in Minnesota, 41 of the 66 rural counties reported birth rates that were higher than the state average in 2009 (Teenwise Minnesota, 2011). When considering the level of sexual activity, the rate of teen pregnancy is more than twice the rate of pregnancy for all sexually active women aged 15-44 (Finer, 2010). Pregnant teens are at increased risk for inadequate prenatal care, pregnancy related hypertension, delivery of low birth weight infants, STI, truncated education and poverty (Casares, Lahiff, Eskenazi, & Halpern-Felsher, 2010); problems that may be exaggerated for those living in resource-poor rural communities.

Although STI surveillance data are not routinely stratified by level of urbanicity, it is recognized that adolescents are disproportionately affected by STIs. Adolescents currently account for nearly half of all newly diagnosed STIs nationally (Weinstock et al., 2004). Factors that place adolescents at increased risk of acquiring an STI include an increased biological susceptibility to infection and barriers to utilization of health care. Biological immaturity, specifically cervical ectopy in adolescence, provides greater susceptibility to the spread of STIs (Youngkin & Davis, 2004). Many STIs, both bacterial and viral, present with very mild symptoms or may be asymptomatic. This may contribute to a delay in recognition and treatment by the adolescent (Shafii & Burstein, 2004). Normal developmental features of adolescence along with the delay between acquisition of infection and diagnosis may contribute to adolescents' lack of association between sexual behaviors and the aforementioned negative outcomes (Shrier, 2004). Recognizing these increased risks, the CDC recommends HIV testing

as a routine part of health care for all people over the age of 13 (2006) and the U. S. Preventative Services Task Force (2007) advocates annual screening of all sexually active women under the age of 24 for chlamydia. Although the CDC has identified policy recommendations for screening and adolescent health education to assist with the recognition of HIV/AIDS and other STI, only one third of the 32 largely rural states currently mandate school-based education on both sexual health and HIV (The Council of State Governments, 2011).

In the U.S., adolescents have the worst access to health care when compared to all other age groups (Klein, 2000; Shone, Klein, Blumkin, & Szilagyi, 2008). Adolescents below the federal poverty level are less likely to have health insurance (National Adolescent Health Informaiton Center, 2008) which may prohibit health care access and treatment seeking behavior. When compared to urban adolescents, rural youth are more likely to go without needed sexual health services including treatment for STIs and birth control. In a study of rural tenth graders (n=1948), more than a third of those who identified needing treatment for a STI did not seek care, and half of those who were sexually active did not seek birth control. Reasons cited for these omissions included concerns over maintaining confidentiality in their small community, embarrassment about seeking services and fear of parental disclosure (Elliott & Larson, 2004). While the majority of youth seeking sexual health services talked to their parents about their decision, almost three fourths said that they would forgo contraceptive services if parental reporting was mandated, with 20 percent continuing to have unprotected sex or rely on the withdrawal method (Guttmacher, 2010). More than half would discontinue sexual healthcare services altogether (Reddy, Fleming, & Swain, 2002).

2.4   RURAL ADOLESCENT CONDOM USE

Despite recent findings that the U.S. has the lowest rate of condom use among developed countries (Bearinger, Sieving, Ferguson, & Sharma, 2007), condoms remain the most commonly used form of contraception among adolescents at coital debut (Falsetti et al., 2003; Manning, Longmore, & Giordano, 2000). Regardless of proven effectiveness, almost 40% of sexually active adolescents nationally did not use a condom at their last sexual encounter (CDC, 2010a), and half of adolescent condom users report inconsistent use (Manlove, Ikramullah, & Terry-Humen, 2008). Rural adolescents are found to be significantly more likely to report not using a condom at the last episode of intercourse than urban youth (Milhausen, et al., 2003; Crosby et al., 2000).

While abstinence is the only absolute method of preventing unintended pregnancy and spread of STIs, abstinence only educational programs (Kirby, 2007) and virginity pledges (Rosenbaum, 2009) have failed to demonstrate substantive impact on rates of sexual activity, teen pregnancy or STIs. The American Academy of Pediatrics currently recommends that 1) those caring for children should support interventions which encourage the use of reliable contraception and condoms; 2) barriers to condom acquisition should be reduced; 3) distribution of condoms at school should be considered appropriate; and 4) those caring for children should provide education about potential reductions in teen pregnancy and STI transmission with condom use as well as the lack of association between condom availability and increased sexual activity (Kaplan et al., 2001). Specific research recommendations include further exploration to better define the relationships between psychosocial factors and other risk and protective factors related to condom use in adolescents (Kirby, et al., 2006a) along with creation and evaluation of

interventions for protective behaviors to prevent HIV in adolescents and rural populations (CDC, 2005; Center for AIDS Prevention Studies [CAPS], 2006).

In exploring the available evidence related to rural adolescent condom use, rural adolescents are found to be disproportionately underrepresented in the research literature. Sixteen studies were identified which examined the outcome variable of condom use among exclusively rural adolescent samples or which provided specific contrasts/comparisons between the rural and non-rural participants. Of these, four (Bell, 2009; Hillier, Harrison, & Warr, 1998; Lichtenstein, 2000; Yarber & Sanders, 1998) used qualitative methodologies including discussion groups and semi-structured interviews. In all of these identified qualitative studies, convenience sampling was used to produce rural samples ranging from n=19 youth at a juvenile detention center (Lichtenstein, 2000), n=38 youth attending 4-H clubs (Yarber & Sanders, 1998), n=309 youth from rural English seaside areas, to n=512 rural youth in eight different regions of Australia (Hiller, et al., 1998).

Five studies used secondary analyses of different years of the same cross-sectional national behavioral surveillance survey allowing for comparison of behavior with non-rural youth (Hensel & Anderson, 2006; Crosby, et al., 2000 Milhausen, et al., 2003) or identification of behavioral predictors of condom use among rural adolescents (Yarber, Milhausen, Crosby, & DiClemente, 2002; Yan, Chiu, Stoesen, & Wang, 2007). This method allowed for rural samples to be generated ranging from n=633 to n=5,745. The later study (Yan, et al., 2007) identified participating rural schools as those in counties with <50,000 residents which may not be entirely representative of rural youth depending on the definition of rural used while the Milhausen group (2003) chose a selective subsample of only African American youth.

Six cross-sectional studies using non-national samples were identified. While all contained relatively large sample sizes (n=241 to n=1,160), all used convenience samples. Three collected data at only one rural school site (Crosby, Yarber, & Kanu, 1998; Delaney, et al., 1997; DiClemente, Brown, Beausoleil, & Lodico, 1993), and one included only incarcerated adolescents from a single facility (Barthlow, Horan, DiClemente & Lanier, 1995). These detained adolescents may have very different risk taking patterns than community dwelling youth. The remaining two used six (Huebner & Howell, 2003) and five (Chewning, et al., 2001) school sites for data collection. However the Chewning study was conducted among exclusively American Indian rural youth, which may limit the clinical relevance of the findings for use in other rural populations. Only one study was identified to report the findings of a randomized, controlled, longitudinal intervention (Stanton, et al., 2006) while a second provided longitudinal assessment using comparison and control groups that were non-randomly selected (Smith, Dane, Archer, Devereaux, & Katner, 2000).

The evidence related to factors influencing rural adolescent condom use is sparse overall. Although the majority of the identified studies conducted among rural youth included behavioral factors such as the use of alcohol or drugs, few included personal or environmental factors. In addition, the use of selective subsamples from rural populations may limit the generalizability of these findings to the broader, largely white rural adolescent population.

2.4.1 Personal Factors Influencing Condom Use

Personal factors that influence condom use are age, gender, race, knowledge, self-esteem, the perception of risk for pregnancy or STI, personal standards for condom use, self-efficacy for

condom use, and personal goals for condom use. Rural African American (AA) youth are found to be significantly more likely to have sex before the age of 15 than non-rural AA youth (Milhausen, et al., 2003). In addition, rural youth who engage intercourse before the age of 15 are significantly more likely to engage in condom non use and have multiple sex partners (Yarber, et al., 2002). When comparing condom use between rural and non-rural youth nationally, rural males are found to be significantly less likely to use condoms and report higher rates of sexual activity than non-rural youth (Crosby, et al., 2000). In examining the impact of age and race on condom use, a study of late adolescent and young adult college students identified that white adolescents use condoms at significantly lower rates than African American youth (Buhi et al., 2010). Similarly, younger white adolescents, age 12-18, are found to be significantly less likely to use condoms when compared to other racial groups (Shafii, Stovel, Davis, & Holmes, 2004).

While knowledge is recognized to be a necessary component of behavior change, instruction on correct condom use has declined sharply with the percentage of high schools providing condom use information decreasing from almost half in 2000 to just over a third in 2006 (CDC, 2007a). The percentage of youth who receive information about HIV and AIDS in the school setting have also declined steadily for more than a decade (CDC, 2007b). Despite ongoing education, widespread misconceptions persist about the correct use of condoms. In a secondary analysis of youth participating in the AddHealth study, incorrect responses about correct condom application were provided by half of respondents, with almost one third identifying Vaseline as acceptable for use with latex condoms and approximately 20 percent misidentifying the protective effects of lambskin condoms compared to latex condoms (Crosby & Yarber, 2001). These misperceptions were present among those with no sexual experience as

well as those with prior condom use. Despite the level of actual knowledge, increases in perceived condom use knowledge have been shown to increase the odds of discussing birth control with a sexual partner before having sex (Ryan, Franzetta, Manlove, & Holcombe, 2007). However, increases in knowledge may not result in actual condom use for rural youth. In a comparison of youth residing in a rural, low-HIV prevalence community and youth in a metropolitan area with a high prevalence of HIV, rural youth were more likely to practice high-risk sexual behavior despite having higher overall knowledge of risk reduction and higher levels of HIV knowledge than their urban counterparts (DiClemente, et al., 1993).

In a qualitative analysis of data generated from rural adolescents (N=309) age 12-17 in the United Kingdom, embarrassment was identified as the main factor undermining personal confidence in the ability to obtain or use condoms (Bell, 2009). Other factors such as low personal aspirations for academic and career pursuits and low levels of self-esteem were also reported to be associated with increased risk-taking behavior. Conversely, a study of rural American Indian adolescents (N=484) found that self-esteem was not significantly associated with condom use or level of sexual activity. Although self-esteem has been shown to vary by gender in rural youth with females reporting significantly lower self-esteem than male youth (Puskar et al., 2010), the role of self-esteem as it relates to condom use by rural youth remains unclear.

Rural dwellers are reported to be 70% less likely than those residing in urban areas to change their current sexual behaviors because of AIDS (Feinleib & Michael, 1998) and are more likely to believe their partner to be HIV negative despite lack of previous testing (Crosby, Yarber, DiClemente, Wingood, & Meyerson, 2002). While rural youth have been found to express minimal levels of worry about the possibility of contracting HIV or a STI, the possibility

of pregnancy stimulates greater concern (Puskar, et al., 1999; Yarber & Sanders,1998). In a sample of rural adolescent detainees (N=19), analysis of focus group interviews revealed that none of the participants reported feeling at risk for HIV acquisition despite current high-risk sexual practices and use of illicit drugs (Lichtenstein, 2000). However, quantitative analysis of data from rural adolescent detainees did find significant associations between worry about catching AIDS and the level of condom use (Barthlow, et al., 1995). Although perceived risk has been found to influence whether or not to use a condom with a current partner, most respondents considered only the risk for pregnancy and typically did not discuss the use of condoms until after unprotected sex when pregnancy was a concern (Hanna, 1998).

Personal standards for condom use, which are reflected in one's attitude toward condom use, have been found to significantly predict intention for condom use and actual condom use (Delaney, et al., 1997). While these data are encouraging, the last 15 years have brought change in rural settings including the expansion of social media and increased exposure to outside influence related to enhanced internet availability, and a more recent examination of personal standards is needed.

Although self-efficacy in youth has been widely studied with regard to the influence on condom use in some populations (Boyer et al., 2000; Gebhardt, Kuyper, & Greunsven, 2003; Gloppen, David-Ferdon, & Bates, 2010; Robertson, Stein, & Baird-Thomas, 2006; Shafer & Boyer, 1991), the results have been mixed. While evaluation of condom use self-efficacy among rural youth was noted to be sparse in the published literature, a study of 484 rural American Indian students in grades 6-12 (Chewning et al., 2001) was identified, which provides limited evidence that self-efficacy to get or use condoms may predict condom use in rural adolescent females. However, self-efficacy was not found to be predictive of condom use for males.

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Similarly, in a nationally representative sample, self-efficacy for sexual negotiation was significantly associated with increased condom use for females but not associated with condom use for males (Pearson, 2006). While a peer-education intervention designed for rural youth did show increased self-efficacy and condom use among the peer-educators (Smith, et al., 2000), the evaluation of an intervention adapted from an urban population, rural youth demonstrated improvements in self-efficacy without resultant improvements in actual use (Stanton et al., 2006).

The role of condom use goals, which is synonymous with short term intention, is relatively unexplored with the outcome of actual condom use among rural adolescents. A single study was identified which examined these factors concurrently in a sample of rural youth. Having higher condom use goals was identified to predict actual use with no differences noted by gender (Delaney, et al., 1997).

While some evidence does exist describing the personal factors influencing condom use in the rural adolescent, their impact has been relatively understudied in this population. Identified gaps include the lack of evidence generated related to the impact of self-esteem on condom use with only one study conducted in a rural minority population exploring these factors (Chewning, et al., 2001); the limited examination of worry about STI or pregnancy as it relates to condom use (Stanton, et al., 2006; Barthlow, et al., 1995); the limited exploration of condom use goals as they relate to actual condom use explored in one study of rural Canadian youth (Delaney, et al., 1997) and the limited available evidence related to the role of peer norms and social support as it relates to actual condom use among rural adolescents. Furthermore, while knowledge is recognized as an integral although insufficient component of behavior change, the findings reporting high levels of risk-taking despite adequate knowledge in the rural adolescent

are especially concerning. Similarly, the role of self-efficacy remains unclear. As knowledge and self-efficacy are often central to health promotion strategies, these results underscore the need for further evaluation of the role of knowledge and self-efficacy examined in concert with other behavioral and environmental variables to better understand competing factors of influence so that appropriate preventative efforts may be introduced.

2.4.2   Environmental Factors Influencing Condom Use

Environmental factors that influence condom use are considered to be peer norms, parental communication about condom use, and perceived social support. The influence of the peer group during adolescence with regard to protective sexual behaviors in rural populations remains ambiguous. Significant effects of peer sexual behavior have been found among adolescents nationally (Ali & Dywer, 2010) with proportional increases in both the level of sexual activity and number of sexual partners reflecting the perceived behavioral practices of their peers. Similarly, findings from national samples have identified that the condom use behaviors of peers positively influence individual condom use behaviors (Henry, Schoeny, Deptula, & Slavick, 2007). In contrast, the level of intention to use condoms or actual condom use was not influenced by peer norms in a sample of rural Canadian youth (Delaney, et al., 1997).

In a qualitative analysis of the rural mother's role in pregnancy prevention for her adolescent daughter, lack of personal knowledge and fear that talking about sexual behavior would be seen as condoning sexual behavior were identified as barriers to communication with their children about sexual health topics (Noone & Young, 2009). Embarrassment and modesty on the part of mothers and daughters were identified as additional barriers to communication

about sexual topics. Rural sexually active females who rarely used contraception were found to be less likely to have spoken with their parents about contraception (Luster & Small, 1994). However, for males in this group, parental discussion about birth control did not significantly influence the level of contraceptive use. It should be noted that the Luster and Small (1994) study did not specifically address condom use; rather a global statement related to discussions about birth control was used. Similarly, in a sample of 1,060 rural youth neither parental communication or parenting style was found to have a direct effect on sexual risk-taking behavior (Huebner & Howell, 2003), however, this study examined general parent-adolescent communication, not communication about sexual topics.

Parent-child relationships may impact sexual behavior differently by race and gender. Among youth nationally, adolescent girls who perceived high levels of parental connectedness and high levels of mother-child communication were less likely to participate in sexual risk-taking (Henrich et al., 2006). However, this did not hold true for adolescent boys. In examining other measures of parental support, maternal demandingness was noted to be a significant predictor of increased condom use for AA youth, but was significantly related to the likelihood of *decreased* condom use in white youth (Cox, 2006). It should be noted, however, that this analysis used a subset of 156 parent child dyads derived from a very large national sample with questionable rural representativeness. No studies were identified among rural adolescents that examined the role of support received from a significant other as it relates to condom use.

While these data may provide some support for the potential need of gender specific interventions, the influence of environmental factors, specifically the effect of peer and parental influence or support, has been inconsistent. Further information is needed to support the strength of these associations as they relate to condom use by rural adolescents. In addition, substantial

gaps have been identified related to the evidence available concerning actual condom use among rural adolescents the role of parental communication and social support from a significant other. Confounding the interpretation of the available evidence, many studies conducted in rural samples as well as those in national samples were noted to utilize nonspecific measures of communication with parents rather than evaluating sexual communication specifically. While this may be a more acceptable approach when working with morally conservative rural communities, it does not significantly augment the depth or breadth of the existing evidence and may have limited clinical significance for preventative efforts targeting sexual risk reduction.

2.4.3   Behavioral Factors Influencing Condom Use

Behavioral factors influencing condom use include the use of condoms at first intercourse, alcohol and drug use, and having multiple sex partners. In national samples of adolescents, condom use at first intercourse is identified to significantly increase the odds of condom use at most recent intercourse (Shafii, et al., 2004; Shafii, et al., 2007). When comparing contraceptive use between rural and urban women, only 5% of rural young women used condoms at first sex as compared to 70% of their urban dwellers, placing rural women at an increased lifetime risk of condom non-use (Rosenfeld & Everett, 2001).

Boredom and lack of community recreation are reported to be common in the rural setting and may contribute to increased risk-taking and substance use (Adimora et al., 2001). Both alcohol and drug use have been associated with decreased condom use and increased sexual risk-taking (Santelli, Brener, Lowry, Bhatt, & Zabin, 1998). The likelihood of alcohol use

among rural adolescents has been shown to increase with age and grade level (Hamdan-Mansour, Puskar & Serieka, 2007) When comparing rates of substance use of rural and urban youth, rural 10th graders were almost 30% more likely to drink alcohol and 70% more likely to have been drunk than their urban counterparts (The National Center on Addiction and Substance Abuse [CASA], 2000). Rural youth who use alcohol, tobacco and marijuana are found to be three times more likely to become sexually active than those who do not use these substances (Adimora et al., 2001).   Evaluation of risk-taking behavior in a sample of 10,273 sixth through eighth graders in rural Tennessee found that only 10% of those who reported substance use were not yet sexually active (Dunn et al., 2008). Secondary analysis of a national sample identified that, for rural adolescents, drinking on more than three of the last 30 days and binge drinking were associated with unprotected sex (Yan, et al., 2007).   However, secondary analysis of rural participants from the same survey taken in a different year did not find comparable associations (Yarber, et al., 2002).

Level of risk-taking behavior may be different by gender. In comparisons of urban and rural adolescents in grades 9th -12th, rural females were found to engage in the same level of high-risk behavior as their non-rural counterparts, while rural males were found to be more likely to have used alcohol and/or drugs before their most recent sexual encounter and less likely to have used condoms when compared to non-rural youth (Crosby, et al., 2000). Multiple sex partners, which are reported as common in rural areas, may further increase the risk of STI transmission. Rural dwellers who report having four or more sexual partners are significantly less likely to use condoms than youth nationally (Crosby, et al., 1998). These findings support earlier work identifying significantly decreased or irregular condom use among rural males who had four or more sexual partners when compared to those with fewer partners (Luster, 1994).

In summary, while sexual risk-taking and substance use among rural youth are frequently reported by prevalence, the personal, environmental and behavioral factors that may contribute to increased risk-taking and condom non-use have been infrequently explored in this population. Gaps in the available evidence were identified for several of the personal, environmental, and behavioral factors examined in this study and include the potential for low external validity due to the use of single data collection sites and the use of specialized populations, inconsistent measurement of study variables, and the lack evidence based interventions to increase condom use among rural adolescents. Much of what we know about the risk-taking behavior of rural youth has been derived through secondary analyses of larger national studies. Given that rural representativeness is rarely reevaluated in these secondary analyses generated from selective subsamples of nationally representative samples, the findings must be interpreted with caution. The similarities reported in sexual risk-taking and the increased levels of drug and alcohol use commonly reported among rural youth reinforce the idea that evidence-based prevention efforts for youth are as necessary in rural areas as they are in urban environments. While the risks for teen pregnancy and STIs including HIV may differ across rural and urban areas, these issues continue to be significant in rural settings, often resulting in disproportionate physical and fiscal burdens for those affected due to the limited resources available in many rural communities.

2.5   PRELIMINARY STUDIES

Two preliminary studies examining personal factors in rural youth were conducted. The first tested the appropriateness of an instrument initially designed for data collection with urban youth in the rural setting, and the second study explored differences in personal characteristics of rural youth by gender. Both studies provide evidence of experience with using behavioral measures in rural high school populations.

2.5.1   Study 1

Haley, Puskar, and Terhorst (2011) conducted a secondary analysis of baseline data from a randomized control trial to evaluate the psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED) when used with community dwelling rural adolescents. The SCARED had been previously been tested among urban adolescent and minority adolescent populations. The sample population consisted of 193 students age 14-18 years (M = 15.57, SD = .93) from three public high schools in rural Pennsylvania who were enrolled in a randomized-controlled intervention study.   The participants were recruited from the ninth, tenth, and eleventh grades. They were predominately Caucasian (86.5%, n = 167) and female (53.45, n = 103). The SCARED instrument was evaluated for internal consistency, test-retest reliability and factor structure. The results showed that the instrument was a valid and reliable tool when used with this school-based, community dwelling rural sample. This study supported the potential transferability of instruments previously proven reliable and valid in urban populations to the rural setting for use with similarly age populations in school-based settings.

2.5.2   Study 2

Puskar, Bernardo, Ren, Haley, Stark, Switala and Siemon (2010) compared the reported levels of self-esteem and optimism in rural adolescents by gender. The sample consisted of 193 students enrolled in a randomized-controlled intervention study. The findings indicated that male youth had significantly higher reported levels of self-esteem (t=4.08, p<.001) as identified by summative scores on the Rosenberg Self-Esteem Scale. Levels of optimism were also noted to be significantly higher for male youth (t= 4.01, p<.001). This study reflects a growing interest in the evaluation of potential gender differences among rural youth with regard to psychosocial variables. The identification of differences by gender is felt to be clinically significant for nurses planning science-based interventions directed at behavior change and risk reduction.

3.0   METHODOLOGY

3.1   STUDY DESIGN

The study design is a descriptive, correlational, comparative, cross-sectional survey using a battery of self-report questionnaires administered in a high-school setting.

3.2   SETTING AND SUBJECTS

3.2.1   Setting

The setting for this study was three high schools located in three separate rural school districts in northwestern Pennsylvania (Table 1).   For the purposes of identifying the sampling frame, the Center for Rural Pennsylvania's [CRP] County or school district definition was used, which considers counties or school districts with fewer than 284 persons per square mile to be rural (2010). The participating high schools are located in high poverty rural areas and draw students from both the local community and the surrounding county. School A is located in a community of 8,770 residents and provides services to 835 students in grades 9-12.   The surrounding community is largely Caucasian (96.3%) with 16.8% of families and 21.8% of individuals living

below the poverty level. School B is located in a community of 3,730 residents and provides services to 356 students in grades 9-12. The surrounding community is largely Caucasian (98.0%) with 11.2% of families and 18.0% of individuals living below the poverty level. School C is located in a community of 825 residents and provides services to 208 students. The surrounding community is largely Caucasian (96.5%) with 21.7% of families and 21.2% of individuals living below the poverty level. Approval for the study was obtained from the Superintendant of Schools for each participating school district.

Table 1 Community characteristics for participating school districts

	School Population	Community Population	Percent in Poverty: Families (US)	Percent in Poverty: Individual(US)	Percent Caucasian
School A	835	8,770	16.8 (11.3%)	21.8 (15.3%)	96.3%
School B	356	3,730	11.2 (11.3%)	18.0 (15.3%)	98.0%
School C	208	825	21.7 (11.3%)	21.2 (15.3%)	96.5%

3.2.2   Sampling frame

A nonprobability sampling design was used for this dissertation study. Participants were a convenience sample of adolescents in grades 9-12 drawn from all students enrolled at each of the participating high schools. The eligible number of participants was 1399 students who were recruited from the high school Health and Physical Education (PE) classes through the use of personal invitation(s) for participation.

3.2.3 Sample size determination

A sample size of approximately 617 adolescents is needed to obtain the necessary 284 sexually active youth. Given the variation in analytic methods employed by this study, the sample size calculation is based on the requirements for logistic regression as it is felt to require the largest potential sample size for meaningful analysis of the analytic methods. Using PASS software for estimation of sample size, a logistic regression of the binary response variable (Y = condom use) on a continuous, normally distributed independent variable with a sample size of 284 observations achieves approximately 80% power at 0.05 significance level to detect a change in probability (Y= 1) from the value of 0.60 at the mean of X to 0.692 when X is increased to one standard deviation above the mean. This change corresponds to an odds ratio of 1.50.

The value of 0.60 was derived from the nationally representative YRBS (CDC, 2010a), survey which indicates that approximately 60% of youth used a condom at last intercourse. In considering that rural youth have been reported to use condoms less frequently than non-rural youth, the sample size was also calculated using a probability of 0.40. This change in probability of condom use did not alter the required number of necessary observations needed (N= 284) to detect a change in probability reflective of an odds ratio of 1.50. In considering the likelihood of a high response rate estimation of sample size was calculated to assess potential changes in power. It was found that a logistic regression of a binary response variable with a sample size of 1000 observations achieves approximately 99% power at a 0.05 significance level to detect a change in probability from a value of 0.60 reflective of an odds ratio of 1.50.

To adjust for the expected proportion of students who have had sexual intercourse, data from the 2009 YRBS survey were used (CDC, 2010a). Given that rural youth have been

identified to be more sexually active than the average, this is considered to be a conservative estimate, which helped assure sufficient numbers of participants to reliably estimate the association between the variables of interest and condom use. Given these data, the expected proportion of eligible sexually active youth is estimated to be 0.46. Therefore, the minimum required number of observations is adjusted as: N = 284 ÷ 0.46 = 617.

3.3   MEASURES AND LEVEL OF MEASUREMENT

The measurement battery consists of a demographic form and eight self-report questionnaires: the Sexual Risk Behavior Beliefs and Self-Efficacy Scales, the Multidimensional Scale of Perceived Social Support, the Parent-Adolescent Communication Scale, the Worry About Sexual Outcomes scale, the Rosenberg Self-esteem scale, the Intentions to Use Condoms scale, and a questionnaire derived from the Youth Risk Behavior Survey. Time for completion of the combined instruments is one class period; approximately 40 minutes.

3.3.1   Demographic Form

Demographic Form (Appendix B.1.1) Data including age, race, gender, current grade level, family living arrangements, academic performance and highest level of parental education were collected using eight items adapted from an existing demographic form (Teleform #160).

3.3.2 Sexual Risk Knowledge

Sexual Risk Knowledge Scale (Shrier et al., 2001). The scale was originally developed to assess knowledge of condom use and sexually transmitted disease in high-risk adolescent females. Four items from the original instrument were modified through collaboration with Dr. Lydia Shrier, to construct gender neutral items for the purposes of this study (Appendix B.1.2). Permission for use of the scale has been obtained (Appendix C.1.1). Format: 15 true/false items Scoring: Correct responses are valued at one with incorrect responses given a value of zero. Scores are summed ranging from 0-15 with higher scores indicating higher levels of sexual risk knowledge. Time: < 10 minutes for completion. Reliability: Internal consistency was found to be α=.79 in a sample of 123 adolescent girls recruited from and adolescent clinic at a large urban children's hospital. Rationale for selection: The availability of reliable instruments measuring sexual risk knowledge designed specifically for the adolescent was noted to be quite limited. The inclusion of graphic content or language which may be viewed as inappropriate in the conservative rural setting further limits instrument selection for this study. The item content, language and phrasing of the items, as well as the estimated reliability of the parent instrument made this scale appropriate for use in this rural adolescent sample.

3.3.3 Rosenberg Self-Esteem Scale

Rosenberg Self-Esteem Scale (RSE): (Robinson, 1973) (Appendix B.1.3). The RSE is a widely used measure originally designed for use with high school students to provide a unidimensional measure of global self-esteem. As the document is available in the public domain, no special

permissions were obtained for the instruments use. Format: 10 items using a 4-point Guttman scale (1-strongly agree to 4-strongly disagree). Scoring: Points are awarded for responses as indicated on the Guttman scale. Five items are reverse scored, and scores for the ten items are summed. The higher the summative score, the higher the self-esteem. Time: <5 minutes for completion Reliability: In a sample of 5,024 high school juniors and seniors the Guttman scale was found to be a reliable measure of self-esteem (α = .92) (Robinson, 1973). Validity: The scale is demonstrated to possess reasonable convergent validity when compared to similar measures and clinical assessment; acceptable discriminant validity with measures of self-stability; and acceptable predictive validity. Rationale for selection: This widely used instrument was selected for its strong psychometric properties as well as its well supported use in adolescent research.

3.3.4   Worry About Sexual Outcomes

Worry About Sexual Outcomes (WASO) *scale:* (Sales et al., 2009). The WASO was developed to measure adolescents' worry regarding outcomes of risky sexual behavior. The scale measures both worry about sexually transmitted infections and pregnancy worry. Two questions were adapted in collaboration with the author to create a gender neutral scale. The readability of the scale reflects a Flesch-Kincaid literacy level of 5.3 (fifth grade). Permission for use of the scale has been obtained (Appendix C.1.2). Format: 10 items using a 4-point Likert response format (1-Never to 4-Always). Scoring: Response values are summed with higher scores reflecting increased worry. The total score range is from 10 to 40; scores on the STI/HIV subscale range from 8 to 22; scores on the pregnancy subscale range from 2 to 8. Time: <5 minutes for completion. Reliability: In a sample of 522 AA females aged 14 to 18, the internal consistency

as measured by Cronbach's alpha is α=.87 for the total measure; α=.90 for STI/HIV worry subscale; α=.71 for pregnancy worry subscale, which are good to acceptable. Validity: Concurrent validity was assessed through correlation with other established measures and with final constructs validated using principle components factor analysis, which revealed a two-factor solution accounting for 64.48% of the explained variance. Rationale for selection: The WASO was designed explicitly for use in adolescent populations and was found to be a reliable and valid measure of worry.

3.3.5   Sexual Risk Behavior Beliefs and Self-Efficacy

Sexual Risk Behavior Beliefs and Self-efficacy (SRBBS) *scales*: (Basen-Engquist et al., 1999). These scales were originally developed to measure psychosocial variables that affect sexual risk-taking and protective behavior in high school students.   The variables measured by the SRBBS include attitudes, norms, self-efficacy, and barriers to condom use. Protective behaviors are measured by five scales: 1) Attitudes about condom use (ACU); 2) Norms about condom use (NCU); 3) Self-efficacy for communicating about condom use (SECM); 4) Self-efficacy for buying and using condoms (SECU); and 5) Barriers to condom use (BCU).   Risk behaviors are measured by three scales: 1) Attitudes about sexual intercourse (ASI); 2) Norms about sexual intercourse (NSI); and 3) Self-efficacy for refusing sexual intercourse (SER).   Permission for use of the scale has been obtained (Appendix C.1.3). Format: 22 items using a 3-point Likert response format for self-efficacy items (1-totally sure to 3-not sure at all) and a 4-point Likert response format for attitude and norm items (1-definitely yes to 4-definitely no) and barrier items (1-I strongly agree to 4-I strongly disagree). Scoring: The tool generates composite scores for

each scale, which are then divided by the number of scale items with reverse scoring indicated for four items (ASI2,ASI3, NSI2 and NSI3). The range of the self-efficacy scales is 1 to 3, and the range of the attitudes, norms, and barrier scales are 1 to 4, which are reflective of the original response categories. Time: 10-15 minutes for completion. Reliability: In a multiethnic sample of 6,213 urban high-school students the internal consistency estimates range from α=.61 to .84 with an average of α= .75, which is acceptable. Validity: Concurrent validity was assessed through comparison of sexual behaviors and the individual scales with final constructs validated using confirmatory factor analysis (Basen-Engquist et al., 1999). Rationale for selection: This instrument was chosen for its sound psychometric characteristics. Several condom use self-efficacy, condom belief, and condom barrier scales were evaluated prior to selection of the SRBSS. While providing strong evidence of reliability and validity for measurement of attitudes, norms, self-efficacy, and condom use barriers, the language and item content contained in the SRBSS was felt to be most acceptable to rural communities given their conservative nature.

3.3.6 Goals for Condom Use

Intention to Use Condoms: (Delaney, et al., 1997) (Appendix B.1.4) This measure was designed to evaluate condom use intention in high-school students. Permission for use of the scale has been obtained (Appendix C.1.4). Format: Five items using a 5-point Likert type response scale (1=always through 5=never). Scoring: Total scores are summed using the numerical values associated with the selected response providing scores ranging from 5 to 25. Time: < 5 minutes for completion. Reliability: In a sample of 640 Canadian youth, aged 13 to 19 years old,

internal consistency of α = .85 was calculated for the total score. Rationale for selection: The Intentions to Use Condoms Scale has demonstrated good psychometric properties when used in adolescent populations. Its relatively simple design makes it appropriate for use with high-school students of varying literacy levels.

3.3.7   Parent-Adolescent Communication

Parent-Adolescent Communication Scale (PACS)*:* (Sales et al., 2008) This scale was originally designed to assess adolescent girls' frequency of communication about sexual issues with their parents. The scale contains a common stem and gender neutral questions with the exception of 'protecting yourself from becoming pregnant' which was changed to 'protecting yourself or your partner from becoming pregnant' for use with both male and female adolescents in collaboration with Dr. Sales (Appendix B.1.5). The readability of the scale reflects a Flesch-Kincaid literacy level of 5.04 (5th grade). Permission for use of the scale has been obtained (Appendix C.1.5). Format: Five items using a four-point Likert response format (1-Never to 4-Often). Scoring: summative scores range from 5 to 20. Items are coded so that higher values indicate more frequent parent-adolescent communication. Time: < 5 minutes for completion. Reliability: Internal consistency of the PACS was α= .88 in a sample of N=520 AA adolescents. Rationale for selection: The PACS was selected because of its strong psychometric properties and its parsimonious design.

3.3.8 Multidimensional Scale of Perceived Social Support

Multidimensional Scale of Perceived Social Support (MSPSS): (Zimet, et al., 1988) (Appendix B.1.6) This scale was developed to assess the perception of social support received and has been used widely in both adolescent and young adult populations. The three subscales contained in the instrument measure the perception of social support (the extent to which the adolescent is able to identify the receipt of emotional support and caring) provided by a social network of family, friends, and a significant other. While the scale is available in the public domain for student use, specific permission for use of the scale was obtained (Appendix C.1.6). Format: Twelve items using a 7-point Likert response format (1-very strongly disagree to 7-very strongly agree). Scoring: The individual responses for the total instrument can be summed to provide a total ranging from 12 to 84. The summed scores are then divided by the number of questions with final scores ranging from 1 to 7. Likewise, the individual responses for the subscales can be summed and divided by the number of items to provide a score for each subscale, with scores ranging from 1 to 7. Higher scores correspond to greater perceived support. Time: <10 minutes for completion. Reliability: In three different subject groups the internal consistency estimates range from α=.84 to .92 for the total scale; α=.81 to .90 for the Family subscale; α=.90 to .94 for the Friends subscale; α=.83 to .98 for the Significant Other subscale. For each of the subscales an average of .89 was calculated which is considered good. Test-retest values for the scale range from .72 to .85 which reflect good stability (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). Validity: Principal components factor analysis was used to confirm the construct validity of the subscale structure as proposed. Rationale for selection: The parsimonious nature of the scale lends itself to co-administration with other measures. This easy-to-use, brief instrument was

found to be reliable and valid in diverse populations of adolescents and young adults. The inclusion of the Specific Other subscale in addition to the Friends and Family subscale(s) is felt to be congruent with influences represented by adolescent developmental theory, capturing an aspect of support for teens which is frequently overlooked by other scales designed to measure social support.

3.3.9   Behavior

Youth Risk Behavior Surveillance Survey (YRBS)*:* (Appendix B.1.7) The Youth Risk Behavior Surveillance System survey has been administered by the CDC on a biennial basis since 1991 to nationally representative samples of youth in the classroom setting.   A total of 15 items was excerpted from the 2011 State and Local Youth Risk Behavior Survey National High-School questionnaire.   Questions selected collected data on patterns of alcohol and other drug use as well as sexual behaviors. As the document is in the public domain, no special permissions were obtained.   Format: 15 multiple response items using either ordinal or interval-like response scale(s). Time: 5 to 10 minutes for completion. Reliability: Test-retest reliability was evaluated using the kappa statistic in a convenience sample N=5316 students in 61 schools across 20 states plus the District of Colombia. Results for the items range from 23.6% to 90.5%, with a mean of 60.7%. Items related to alcohol and other drug use had a mean kappa=63.4%; sexual behavior had a mean kappa=62.7% (Brener et al., 2002). Rationale for selection: Rationale is provided for each of the item sets contained in the 2011 YRBS.   These rationales were considered when selecting items to assure consistency with the study purpose. While the location (state) used for data collection for this study has participated in only two of the last 10 YRBSS surveys, the

consistency of item construction between surveys allows for comparison of group responses with those of a nationally representative sample of youth.

3.4   DATA COLLECTION

Week One: The Principal Investigator (PI) met collectively with the Health and Physical Education (PE) faculty members and Principal at each of the participating high-schools. This informal informational session allowed the PI to be formally introduced to the high-school faculty and explain the purpose of the study. Time was allowed for questions. The PI and the Health/PE faculty collaboratively discussed the best date and time for data collection (survey administration) to assure comprehensive coverage of all eligible participants. This collaborative effort helped to minimize classroom disruption and allowed for adequate allotment of time for the survey administration by the classroom instructors. A comprehensive listing of all enrolled students with current mailing addresses was requested from participating school to be used for mailing parental notification forms.

Week Two: The PI visited each of the Health and PE classrooms either in person or via closed-circuit television to introduce the study to all eligible students and invite participation. A brief script was used to provide introductory information related to the study. This helped assure consistency of the information provided to each class. As a waiver of parental consent was granted by the IRB, parental notification forms (Appendix D) were mailed to the parents of all enrolled students. A copy of the survey questionnaires was placed on file at the Principal's office at each school for review by interested parents.

Weeks Three and Four: The PI made visits or phone calls to each of the participating high schools to provide additional information as needed and answer questions as they arose. The PI was available to review the survey questionnaires with interested parents.

Weeks Five and Six: Surveys were administered at all schools in the Health and PE classes during regularly scheduled class time at school 1 & 2 and in homeroom class in school 3. At the time of the survey administration, the PI or a research assistant introduced the survey using a prepared script which reviewed the purpose of the study, specific directions for completion of the survey forms, instructions not to place the participant's name on the survey materials, and a reminder of the voluntary nature of the study. Participants were again asked if they wanted to participate. As a waiver of consent was granted by the IRB, completion of the written survey served as the only confirmation of assent. The survey packets were distributed to participants by the person introducing the survey along with a sharpened #2 pencil used for survey completion. To help ensure confidentiality and anonymity of the data collected, the series of surveys for each individual was denoted by a pre-printed number on each survey and the surveys were bundled in a plain 9" x 12" clasp envelope for distribution and collection. The identifying pre-printed number was not placed on the outside of the plain 9" x 12" clasp envelope. No individual linkages were created between the individual participant and the data collected. The pre-printed numbers were used only to identify that all responses were provided by one participant for purposes of data analysis. At the completion of all survey materials, participants were instructed to put their questionnaires in the plain clasp envelope, seal the envelope and return it directly to the person administering the survey. For students who were not eligible or who choose not to participate in the project, an alternative activity was provided by the teacher for the class period in which the surveys are administered.

3.4.1   Data Management

Each of the completed surveys was evaluated by hand for completeness. Pre-coding of data collection forms was completed prior to data entry, and any ambiguous responses were verified in collaboration with an independent consultant from the University who was not directly involved in the current project to help minimize error during data processing. Once the data collection forms were cleaned and coded appropriately, data files were created for analysis. This consisted of computing of scores for each instrument, labeling variables and individual values, and coding missing values. Upon completion of the initial data entry, 10 percent of the data were randomly verified by an independent consultant from the University to ensure accuracy of data entry. All data files are currently stored in a password protected computer system which will be maintained by the PI.

3.4.2   Data Screening Procedures

3.4.2.1 Preliminary analyses. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 17.0. Data were assessed for accuracy by examining for inconsistencies in data entry or coding using univariate descriptive statistics. A detailed descriptive analysis included the generation of frequency counts and percentages for the categorical variables (race, gender, grade, grade performance, parental education level, sexual activity, alcohol and drug use, condom use). Measures of central tendency, which include the arithmetic mean for normally distributed data and the median for data that may be skewed, along

with the standard deviation and range, respectively, were calculated for all continuous variables (age, summative scores) used in the analysis.

Histograms with normality curves, box plots, and scatterplots were generated to provide graphical representation of the data for collaborative analyses. Assessment of skewness and kurtosis was conducted for continuous variables. The output was further examined for normality, the presence of possible out-of-range values, univariate outliers, and the plausibility of the means and standard deviations for each scale. Patterns of missing data were evaluated.

Psychometric properties of the established scales were verified in this sample. Internal consistency wase estimated using Cronbach's coefficient alpha. For scale items that are binary, Kuder-Richardson's formula 20 was used.

Normality: Univariate normality was assessed using graphical assessment of histograms with normal distribution overlay, normal probability plot of standardized residuals, P-P plot, and Q-Q plot. Both skewness and kurtosis were assessed statistically, with values near zero indicating the presence of normality of distribution, and by visual assessment. The Shapiro-Wilks test was not used to assess normality due to the anticipated large sample size. The Kolmogrov-Smirnov test was considered only in conjunction with the graphic depictions due to the overly sensitive nature of the statistical test. Although the use of logistic regression does not require meeting the assumption of normality, it was felt that the presence of normality in the independent variables will enhance power. Normality is a required assumption of other statistical methods employed for analysis.

Homogeneity of variance: To assess for homogeneity of variance the Levene's test was generated. The *p* values were examined for significance with *p* values $\leq$ .05, indicating that the variances are significantly different and the assumption of homogeneity of variances has been violated. For values > .05 the assumption was considered met. Given that large sample sizes can produce significant results even when the variances are not very different, the result of the Levene's test was considered in conjunction with the variance ratio for interpretation.

Univariate and Multivariate Outliers: The presence of univariate outliers was initially identified through review of box plots and histograms for the raw grouped (by condom user and condom non-users) and ungrouped data. Univariate outliers were further explored by assessing the saved standardized values. Cases with very large standardized values (|z-scores| $\geq$ 3.29) were deemed to be univariate outliers. Multivariate outliers were identified using the Mahalanobis distance statistic. Potential outliers were evaluated individually to identify on which variable(s) the outlier was reflecting deviation and whether or not it should be considered an influential data point and the impact of that influence.

Multicollinearity: Multicollinearity among predictor variables was assessed through the initial screening of bivariate correlations with correlations >.90 being considered problematic (Tabachnik & Fidell, 2007). Multicollinearity statistics, tolerance and variance inflation factors (VIF) were computed with low tolerance levels (< .10) and high VIF values (>10) considered to indicate the presence of severe multicollinearity.

Independence of observations: The assumption of independence was considered met as the data were collected in a cross-sectional manner with each student being afforded only one opportunity for questionnaire completion, thereby prohibiting duplication of data.

Assessment of Missing Data: Missing data were described using the missing value analysis (MVA) procedure in SPSS. The pattern of missingness as well as the amount of missing data was evaluated. EM correlations were generated, and Little's MCAR test was used to assess whether the data were missing completely at random (MCAR). A separate variance t-test was used to determine if the missingness for each variable was predictable from the other variables of interest. Listwise deletion was used given the size of the sample and the small amount of missing data.

Linearity and Homoscedasticity: Visual assessments of the bivariate scatterplots were used to assess linearity. Homoscedasticity was evaluated through both the visual analysis of the plots of standardized residuals vs. the standardized predicted values and the Breusch-Pagan test.

Linearity in the Logit: As logistic regression assumes the presence of a linear relationship between continuous predictors and the logit transformation of the dependent variable of condom use, this assumption was assessed using the Box-Tidwell approach. Using this approach, a logistic model was created with the dependent variable of condom use predicted by each of the continuous variables plus the interaction between each predictor and its natural log.

Data Transformation: For violations of the assumptions of normality, linearity, linearity in the logit, homoscedascity or the presence of outliers, data transformation was considered. To correct for these violations, transformations were attempted using the square root, exponential, or logarithmic transformations. Screening measures were repeated for transformed distributions and compared with the untransformed data for improvements. To correct for negative skewness, the values were reflected prior to transformation of the variable.

3.4.3 Data Analysis Plan for Primary Aim 1

Primary Aim 1: *To describe the personal, environmental and behavioral factors related to condom use in sexually active rural youth.*

The specific research questions addressed by this aim include:

Among rural high-school adolescents in grades nine through twelve…

1) what are the current levels of knowledge, self-esteem, perceived risk, personal standards, self-efficacy, social norms, condom use barriers, goals for condom use, parent-adolescent communication, and social support?

2) what is the prevalence of condom use?

3) what is the prevalence of high-risk behavior(s) which may contribute to the acquisition of STI or teen pregnancy?

Descriptive statistics (i.e.: mean, median, standard deviation, range) based on the distribution of the data were used to characterize the sample of rural youth with regard to level of knowledge of condom use and sexually transmitted disease; level of self-esteem; personal

standards of behavior for condom use and sexual activity; perceived self-efficacy for using condoms, refusing sex, and communication; perceived social norms for condom use and sexual activity; level of social support from friends, family, and significant other; level of communication with parents about sexual health and behavior; perception of risk for pregnancy or STI acquisition; barriers to condom use. In addition to point estimates, corresponding interval estimates reflective of the 95% confidence interval were calculated. Prevalence was assessed through the generation of frequency counts; percentages were computed for those engaging in behaviors including alcohol and drug use, early sexual debut, and contraceptive use at last sex, and condom use. The data were further described in terms of gender and grade level.

3.4.4   Data Analysis Plan for Primary Aim 2

Primary Aim 2: *To compare differences in the personal, environmental, and behavioral factors among sexually active rural youth who currently use condoms and those who do not.*
The specific research questions addressed by this aim are as follows:

> Among sexually active rural high-school adolescents in grades nine through twelve…

4) are there significant mean differences in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

5) are there significant mean differences *by grade* level in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

6) are there significant mean differences *by gender* in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

To address question four, independent samples t-tests were considered to examine the mean differences for each personal, environmental, and behavioral variable between sexually active rural youth who use condoms and those that do not. The t-tests were not appropriate for use due to significant violations of assumptions; therefore the Mann-Whitney U test was employed to assess the difference in means for continuous variables. Chi-square statistics were calculated to assess differences in proportion for categorical behavioral variables to answer questions four through six. For questions five and six, General Linear Modeling (GLM) was initially used to explore the mean differences for each continuous variable by grade and gender.

To assess for differences in variable scores for those who use condoms and those who do not by grade, a two factor GLM was conducted for sexually active youth using the scores for each personal and environmental variable as a function of condom use (yes, no) and grade level (9th, 10th, 11th, and 12th) among only those identified as sexually active. Profile plots were generated as a means of visually assessing for potential interactions and pattern of differences. The F-test was used to identify significant differences on variable scores among the four grade levels averaged over condom users and non-users (main effect of grade), whether there was a difference on variable scores between condom users and non-condom users averaged across grade levels (main effect of condom use), and whether the effect of grade level was dependent on condom use (interaction of grade*condom).

For significant interactions, simple effects analysis was used to further explore the interaction of gender within each level combination of grade to asses for differences. For interactions that were not noted to be statistically significant, the main effects were examined for differences. Where differences were noted, the pattern of differences was examined. In order to find the pattern of differences on the variable scores among grade level between condom users

and non-condom users, the simple main effect of grade was analyzed at each level of condom use. When significant differences were identified for variable scores among grade levels for each category of condom use, they were followed by simple pairwise comparisons among the four grade levels using Sidak-Bonferroni correction for control of familywise Type 1error rate. The effect size, or the proportion of variance attributable to the effect in the sample, was calculated through interpretation of the Eta squared (η^2) values.

Critical violations of the assumptions of the GLM method required the use of the nonparametric Kruskal-Wallis analysis of ranks the evaluation of differences for continuous variables addressed in question five; Mann-Whitney U tests were used to evaluate differences for continuous variables addressed in question six. The use of the Kruskal-Wallis test did however limit the ability to examine the interactions among independent variables; therefore, the analysis was conducted using both methods and results were evaluated for differences due to the robust nature of GLM methods.

3.4.5 Data Analysis Plan for Primary Aim 3

Primary Aim 3: *To examine associations among personal, environmental, and behavioral factors and to identify predictors of condom use in sexually active rural youth.*

The specific research questions addressed by this aim include:

Among rural high-school adolescents in grades nine through twelve…

7) are there differences in the direction or magnitude of association between personal, environmental, and behavioral factors and condom use?

8) what are the personal, environmental, and behavioral factors which significantly increase the odds of condom use?

To assess the magnitude of association between the dichotomous variable of condom use and its potential correlates the point-biserial correlation was planned. Due to the non-normality of the data, non-parametric Spearman's correlation was used to assess the magnitude of association between variables. To further examine the relationships among the dichotomous outcome variable of actual condom use and the personal, environmental and behavioral variables of interest, logistic regression was calculated for the subsample of sexually active youth. Relationships between and among the variables were assessed individually and through the creation of two-way interaction terms. Hierarchical logistic regression models were produced based on the posited theoretical relationships of the variables with the dependent variable of condom use with backward elimination of variables at each step. The overall fit of the model was evaluated using the -2 log-likelihood statistic and its associated chi-square statistic. Output from the *variables in the equation* output was evaluated to determine which variables significantly predict the outcome.   In an effort at parsimonious representation, only those variables that were found to be significant predictors were included in the final model. Further assessment of model fit was conducted through examination of residuals. The odds ratio provides a measure of likelihood that an individual will use condoms given the presence of the examined factors. In addition to the Wald statistic, the odds ratios, represented by Exp (B) in SPSS, was evaluated along with the significance value and confidence interval to determine significance of the findings with values greater than one indicating an increased likelihood of condom use and values less than one indicating decreased odds of condom use.

3.4.6　Data Analysis Plan for Secondary Aim 1

Secondary Aim 1: *To compare differences in the personal, environmental, and behavioral factors among all rural youth.*

The specific research question addressed by this aim is:

9) Among all rural high-school adolescents in grades nine through twelve are there significant mean differences by gender or grade level in the personal, environmental, and behavioral factors as they relate to condom use?

To assess for differences in variable scores by gender and grade among all participants, a two factor GLM was conducted for sexually active youth using the scores for each personal, environmental, and behavioral variable as a function of gender (male, female) and grade level (9th, 10th, 11th, and 12th). Profile plots were generated as a means of visually assessing for potential interactions and pattern of differences. The F-test was used to identify significant differences on variable scores among the four grade levels averaged over gender (main effect of grade), differences on variable scores between males and females averaged across grade levels (main effect of gender use), and effects of grade level dependent on gender (interaction of grade*gender). For significant interactions, simple effects analysis was used to further explore the interaction of gender within each level combination of grade to asses for differences.

If interactions were not statistically significant, the main effects were examined for differences. If differences were noted, the pattern of differences was examined. In order to find the pattern of differences on the variable scores among grade level between males and females, the simple main effect of grade was analyzed at each level of gender. The identification of

significant differences on variable scores among grade levels for each category of gender was followed by simple pairwise comparisons among the four grade levels while using Sidak-Bonferroni correction for control of familywise Type 1 error rate. The effect size, or the proportion of variance attributable to the effect in the sample, was calculated through interpretation of the Eta squared (η^2) values. As mentioned previously, critical violations of the assumptions for the outlined analysis required the use of the nonparametric Kruskal-Wallis analysis of ranks. The use of the Kruskal-Wallis test did, however, limit the ability to examine the interactions among independent variables; therefore, the analysis was conducted using both methods, and results were evaluated for differences due to the robust nature of GLM methods.

3.4.7   Data Analysis Plan for Secondary Aim 2

<u>Secondary Aim 2</u>: *To examine the associations among the personal, environmental, and behavioral factors and to identify predictors of personal condom use goals in rural high-school youth.*

The specific research questions addressed by this aim include:

Among rural high-school adolescents in grades nine through twelve…

10) are there differences in the direction or magnitude of association between level of knowledge, perceived risk, personal standards, self-efficacy, self-esteem, condom use barriers, social norms, parental communication, substance use, social support, and personal condom use goals?

11) what are the relative contributions of the personal, environmental, and behavioral factors that significantly predict personal condom use goals?

To address question ten, bivariate relationships between condom use goals and potential correlates were completed using Pearson product-moment correlation. Due to the non-normality of the data, non-parametric Spearman's correlation was used to assess the magnitude of association between variables. To answer research question eleven, linear regression models were constructed to identify the relative contributions of the personal, environmental, and other behavioral factors with the personal factor of condom use goals as the dependent variable of interest among all youth in the sample. In striving to identify a parsimonious model, the contributions of the potential covariates (gender, grade level) were explored by entering each variable in the model in an individual and combined fashion to assess its full and unique relationship to the dependent variable.

All variables were initially entered into the regression equation using multivariable regression. The squared semi-partial correlations were evaluated for the unique contribution of each independent variable to the percent of variance explained. These unique contributions were further evaluated for significance by examination of the t statistics generated for each independent variable. Potential covariates were dropped from the model if they were found to be non-significant (<0.05). Potential interactions were assessed for each variable prior to deletion from the model. After this determination, remaining variables were assessed for plausibility, and the model was refit and reexamined. The ANOVA table generated using this approach was examined to evaluate the overall F-test for R^2, with the model summary providing the partial F statistic (F change) for each predictor in the model and to assess whether or not this change was significant. The R^2 statistic was examined to evaluate the proportion of variance explained in this sample by the predictors, with the adjusted R^2 identifying the proportion of variance explained in the population.

3.4.7.1 Amendment to Data Analysis Plan for Secondary Aim 2. Upon assessment of the regression diagnostics, several violations of fundamental assumptions for multiple regression were noted. These violations included non-linearity, non-normality of the residuals, and heteroscedasticity of the data. Attempts were made to transform the independent and dependent variables individually and in combination, however, this did not result in satisfactory improvement of the data. Due to the identified violations the use of multiple regression was deemed inappropriate for these data. The dependent variable was dichotomized to reflect those having high goals for condom use and those having lower goals for condom use and logistic regression was used to examine the relationships among variables of interest. To meet the assumption of linearity in the logit the variables of Worry about STI and Worry about Pregnancy were also dichotomized (1=worry; 0=no worry) when attempts at transformation failed.

Relationships between and among the variables were assessed individually. Logistic regression models were produced and the overall fit of the model was evaluated using the -2 log-likelihood statistic and its associated chi-square statistic. Output from the *variables in the equation* output was evaluated to determine which variables significantly predict the outcome. In an effort at parsimonious representation, only those variables that were found to be significant predictors were included in the final model. Further assessment of model fit was conducted through examination of residuals. In addition to the Wald statistic, the odds ratios, represented by Exp (B) in SPSS, was evaluated along with the significance value and confidence interval to determine significance of the findings with values greater than one indicating an increased likelihood of condom use and values less than one indicating decreased odds of condom use.

3.4.8 Limitations

The racial composition of the sample is felt to be reflective of the demographic profile of the rural counties in which the data were collected (Table 2). The rural high school setting for the study contained a largely Caucasian population and therefore findings from this study may not be generalizable to more diverse rural populations or rural youth who do not attend school. While providing a means to assess associations, the use of cross-sectional data collection does not allow for inference of causation. Additionally, while evidence supports using condom use at last intercourse as a proxy measure for condom use behavior to limit memory error (Younge et al., 2008), reports of the validity of self-reported condom use in the adolescent population is mixed (Rose et al., 2009; Shew et al., 1997). The use of self-report data collection to assess sexual behavior is subject to recognized limitations of self-report, such as the provision of socially desirable responses and the possibility of over or under reporting of the behavior of interest (Graham, Crosby, Sanders, & Yarber, 2005).

Table 2 The anticipated gender and minority distribution of the participants

	White-not Hispanic origin	Black- not Hispanic origin	Hispanic	Asian or Pacific Islander	Native American or Alaskan Native	Other or Unknown	Total
Female	296 (98%)	0-3 (<1%)	0-3 (<1%)	0-3 (<1%)	0-3 (<1%)	0-3 (<1%)	302(49%)
Male	308 (98%)	0-3 (<1%)	0-3 (<1%)	0-3 (<1%)	0-3 (<1%)	0-3 (<1%)	315(51%)
Total	604 (98%)	0-6 (<1%)	0-6 (<1%)	0-6 (<1%)	0-6 (<1%)	0-6 (<1%)	617(100%)

3.5   HUMAN SUBJECTS

3.5.1   Human subjects

The high school students who participated in the study were asked to provide anonymously recorded data that were not linked in any manner to personal identifiers. The data provided included demographic and questionnaire data. To increase the confidentiality of responses, each participant was provided with a plain 9" x 12" clasp envelope in which the completed questionnaires were returned. All questionnaires, sealed in the envelope provided, were returned directly to a member of the research team. All study data are stored in a locked filing cabinet, and all records containing identifiable, although unlinked, information (such as parental notification forms with signatures and class mailing lists) are stored in a separate locked filing cabinet. All study data are managed in a secure password-protected database. Only the PI and those directly involved in data entry have access to the original research materials. Research records will be maintained for a minimum of six years after the completion of the research study. Individual responses will not be shared unless presented in aggregate. Individual participants and participating schools will not be identified by name for purposes of this study or future publications.

3.5.2   Protection of human subjects

This study was approved by the Institutional Review Board (IRB) of the University of Pittsburgh. As this research involves minimal risk to the participants and could not practicably

be carried out without a waiver of consent, a waiver of parental consent was obtained. Although a waiver of consent was obtained, parental notification for the study was distributed by mail to the parents of all adolescent participants (Appendix D). Measures were taken with the study design as well as the construction and design of the survey instruments to help protect anonymity and confidentiality of participant responses.

3.5.3   Inclusion criteria for the project

Inclusion criteria for the project include: 1) Current high school enrollment, 2) age between 13 years and 19 years, 3) able to speak and understand English, and 4) able to complete the survey questionnaire independently. Exclusion criteria include: 1) Inability to meet one or more of the aforementioned criteria.

3.5.4   Potential risk

There were minimal risks involved in the participation of the study. Participants might have felt uncomfortable sharing information about their sexual behavior and/or drug and alcohol use. Loss of confidentiality was seen as a risk due to the sensitive nature of the questionnaire(s) items.

3.5.5   Recruitment and informed consent

Students were recruited in 9th – 12th grades from the health, PE, and home room classes at two participating high-schools located in two rural communities. The PI visited the health, PE, or

homeroom classes to invite participation and answer questions about the study prior to the mailing of parental notification forms. As the participating school districts get parental permission for students to be provided sex education prior to the delivery sex education content, getting active parental consent for the completion of a survey related to content covered in the traditional classroom setting may be viewed as redundant by the parents, thereby limiting the likelihood of the return of the consent forms and potentially increasing participation burden. Additionally, the collection of physical signatures would provide the only evidence of participation in the survey. In a rural community, this could have compounded concerns over confidentiality and potential discovery of personal risk behaviors. As the survey elicited information about sexual behavior, this concern over potential discovery through loss of confidentiality of the signed consent/assent forms could have impacted the adolescents desire to participate in the study and potentially influence their honesty of responses. A waiver of parental consent was granted from the IRB for this project.

Given the anonymous nature of the survey, the protections in place to protect confidentiality of responses, and the low risk nature of the survey content, this request for a waiver of consent is felt to be appropriate and ethical. In addition to providing additional participant burden in this instance, the collection of active parental consent is recognized to decrease participation in behavioral health risk surveys by 50 percent (CDC, 2009b). The collection of active parental consent could have served to unintentionally exclude participation by minorities, those having problems in school, and those who may already be participating in high-risk behavior (Tigges, 2003). In light of these reports, denial of the consent waiver could have potentially impaired recruitment efforts to such an extent that the resultant sample size may be unable to yield statistically meaningful results. Although a waiver of parental consent was

granted, parents were made aware of their child's being invited to participate in this research project through the mailing of a parental notification form directly to the child's home address. Through use of the notification form, the parents were extended the opportunity to ask questions about the research study and review the survey instruments.

3.5.6 Protection against risks

Participation in the study was entirely voluntary, and at no time were any threats associated with failure to participate in the study or failure to answer specific questions. At no point in time were the individual questionnaire(s) responses shared with parents, teachers, or school officials unless presented in aggregate form. Privacy and confidentiality were assured by not providing individual identifiers for the participants. Additional measures to protect confidentiality of responses included the exclusion of skip patterns (all items may be answered by all participants) in the survey questionnaires to avoid inference of the presence or absence of behavior to others at the time of data collection. The use of plain clasp envelopes to secure survey materials for distribution and collection and the collection of completed questionnaires by trained research staff were designed to help enhance the confidentiality of responses. Trained research staff members were available at each data collection point to help further assure confidentiality of materials. All study data are kept in a locked file cabinet located at 254 Swarts Hall, University of Pittsburgh Campus under the supervision of the PI for a minimum period of six years.

3.5.7 Potential Benefits of the Research to the Subjects and Others

While no direct benefit is likely to result from participation in the study, the information generated may serve to benefit rural communities in general as well as adolescents residing in rural areas through its use in the design/transfer of future intervention efforts to be constructed for rural youth.

3.5.8 Importance of Knowledge Gained from the Study

This minimal risk study provides knowledge of great importance in helping to understanding the personal, behavioral, and environmental factors that contribute to condom use and nonuse in this hard-to-reach rural adolescent population. The constellation of variables examined in this study has been previously unexplored in the rural adolescent and therefore serves to augment current knowledge in the field.

3.5.9 Inclusion of Women and Minorities

While racial diversity is increasing in rural America, the rural population remains largely white (Johnson, 2006). The rural region in which the study was conducted is largely white with limited racial diversity. Both female and minority participants were invited to take part in the research project. The enrollment of female and minority participants was found to be consistent with the

demographic profile of the communities in which the data collection took place. While no special measures were taken to oversample minority participants, recruitment efforts emphasized the importance of participation by all students.

3.5.10 Inclusion of Children

Children between the ages of 13 and 19 were the population of interest. Children less than 13 years old are legally unable to consent to sexual intercourse and not eligible for most family planning services in the state of Pennsylvania. As the behaviors of interest for this research project do include condom use and sexual behaviors, children younger than 13 were excluded.

3.5.11 Data Safety Monitoring Plan

Data and safety monitoring was conducted during monthly meetings with the dissertation Chair and in consultation with other committee members. If warranted, these meetings would have included discussions of confidentiality issues, recruitment issues, and any adverse events that may arise associated with the study. However, no issues related to confidentiality, recruitment, or adverse events arose during the study. Any adverse events would have been immediately reported to the IRB.

4.0   RESULTS

4.1   OVERVIEW OF THE RESEARCH PROJECT

4.1.1   Participants and Response Rate

Of the 1399 students actively enrolled at the participating school districts at the time of the survey, 53 students were ineligible due to exclusion from participation by their parents and an additional 184 were not present on the day of survey administration. Three students were present but did not fall within the required age parameters for the study.   Therefore, 1159 students were considered eligible to participate on the day of survey administration. Of the eligible students, 93.4% (N=1082) completed valid surveys. Of the remaining 6.6%, a small number elected not to participate before the start of the survey (1%; n=12), chose to stop participation before completing the entire survey (0.8%; n=9), or provided logically inconsistent (0.3%; n=4) or incomplete data (4.5%; n=52) and were therefore eliminated from the analysis.

The survey sample consisted of 1082 students from three rural high schools with 58% (n=628) from School A, 26.2% (n=284) from School B, and 15.7% (n=170) from School C.   No significant differences were noted between schools by participant age (F (2, 1079) = 1.15, p = .31), gender (χ^2(2)=.521, p=.77), or race (χ^2(10)=.11.55, p=.31). Participants were 51.5% female (n=557), largely Caucasian (94.2%, n=1019) and ranged in age from 13 to 19 years (M=16.04,

sd1.24). Respondents were somewhat evenly dispersed across grade levels with the largest percentage (26.3%, n=285) enrolled in the 12th grade and the smallest percentage (23.9%, N=259) in the 11th grade.   Most performed well academically with a majority reporting that they typically earned mostly A's and B's (61.2%, n=662). Only a small percentage reported earning mostly C's and D's (8.2%, n=89) or D's and F's (1.3%, n=14). A large percentage identified that they lived with two parents, including a step-mother or step-father (65.4%, n=708), while a smaller number reported that they lived exclusively with either a mother or stepmother (18.9%, n=205) or a father or stepfather (7%, n=76). Although a small percentage of students identified that they did not know their mother's (6.3%, n=68) or father's (10.4%, n=112) highest level of educational attainment, participants reported that 33.1% (n=358) of mothers and 40% (n=434) of fathers had earned a high school diploma.

The majority of students (57.1%, n=618) reported a history of sexual activity with sexual activity becoming more prevalent as students progressed from 9th (35.1%, n=95) through 12th (76.5%, n=218) grade. Alcohol use in the last 30 days was reported by 36.5% (n=395) of students, while 17.6% (n=190) of students had used marijuana in the last 30 days, and 2.9% (n=31) had used cocaine. One fifth (21%, n=227) of those surveyed had used prescription drugs without a prescription at some point in their lifetime. Less frequent lifetime use of inhalants (13.5%, n=146), methamphetamines (4.5%, n=49), and steroids (2.8%, n=30) was reported.

No differences were noted between those who were sexually active and those who were not with regards to race ($\chi^2(5)=9.05$, p=.107) or gender ($\chi^2(1)=.35$, p=.550). Those who reported a history of sexual activity were found to be significantly older (M=16.39, sd=1.15) than those who were not sexually active (M=15.58, sd= 1.20; t(1080)=11.14, p<.001) and the living arrangements of students were found to be significantly different between those who were

sexually active and those who were not (χ^2(3)=31.31, p<.001). Although no differences were noted among those who lived with single fathers, a lower percentage of students who were sexually active lived in two parent households (58.7% v.75.0) while a higher percentage of students who were sexually active were found to live with single mothers (23.3% v. 13.4%). A higher percentage of mothers (10.2% v. 4.1%; χ^2(4)=23.852, p<.001) and fathers (13.6% v. 3.9%; χ^2(4)=41.01, p<.001) of sexually active students had less than a high-school education, although no differences were noted in the percentage of parents who graduated from high-school or obtained secondary education. Additionally, a higher percentage of those who were sexually active reported earning mostly B's and C's or C's and D's than students who were not yet sexually active; with a significantly higher percentage of virginal students earning mostly A's and B's when compared to sexually active students (χ^2(3)=42.17, p<.001).

4.1.2 Problems Encountered

Record snowfall and poor weather conditions were a challenge. Inclement weather in the months of January and February may have contributed to the high absentee rate noted at each of the data collection sites. While this had the potential to impact the availability of participants, the overall response rate was adequate for the study as outlined. Considerable efforts were made to establish collegial relationships with school administration and faculty prior to the introduction of the survey in the school setting. Several visits were made to the school site(s) by the P.I. to become familiar with the school layout(s) and become acquainted with key personnel. No problems were encountered in the data collection process.

A contingency plan was developed for analysis of predictors of condom use goals which was a departure of the original data analysis plan. Because the data did not meet the assumptions for multiple linear regression, the analysis plan needed to be amended. However, the resulting dichotomization of the continuous condom use goal variable for purposes of logistic regression did allow for the identification of predictors for high goals for condom use among all rural adolescents.

4.2   MANUSCRIPT

The following manuscript, *Condom use among sexually active rural high-school adolescents: Personal, environmental, and behavioral predictors*, was created to disseminate findings related to the primary aims of the study.

Addressed within the manuscript are the following:

Primary Aim 1: *To describe the personal, environmental and behavioral factors related to condom use in sexually active rural youth.*

RQ 1: Among sexually active rural high-school adolescents in grades nine through twelve, what are the current levels of knowledge, self-esteem, perceived risk, personal standards, self-efficacy, social norms, condom use barriers, goals for condom use, parent-adolescent communication, and social support?

RQ 2: Among sexually active rural high-school adolescents in grades nine through twelve, what is the prevalence of condom use?

RQ 3: Among sexually active rural high-school adolescents in grades nine through twelve what is the prevalence of high-risk behavior(s) which may contribute to the acquisition of STI or teen pregnancy?

Primary Aim 2: *To compare differences in the personal, environmental, and behavioral factors among sexually active rural youth who currently use condoms and those who do not.*

RQ 4: Among sexually active rural high-school adolescents in grades nine through twelve, are there significant mean differences in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

Primary Aim 3: *To examine associations among the personal, environmental, and behavioral factors and to identify predictors of condom use in sexually active rural youth.*

RQ 7: Among rural high-school adolescents in grades nine through twelve, are there differences in the direction or magnitude of association between the personal, environmental, and behavioral factors and condom use?

RQ 8: Among rural high-school adolescents in grades nine through twelve, what are the personal, environmental, and behavioral factors which significantly increase the odds of condom use?

4.2.1 Abstract

Adolescents who engage in unprotected intercourse are at risk for pregnancy and sexually transmitted infection (STI). Although adolescents in rural areas participate in levels of sexual risk-taking similar to that of non-rural youth, few data are available identifying factors that influence condom use among rural adolescents. The purpose of this study is to determine the predictive value of selected personal, behavioral, and environmental factors for condoms use among rural adolescents in grades 9-12. A cross-sectional survey was conducted among sexually active youth (N=613), ages 14-19, in three rural school districts in the Northeast. Using logistic regression, identified predictors for condom use include personal standards for condom use (OR = 2.45; CI 2.39-6.47), condom use goals (OR = 1.32; CI 1.21-1.45), condom use at first intercourse (OR = 3.93; CI 2.39-6.47) and male gender. School nurses are encouraged to incorporate identified predictors of condom use in when designing interventions promoting safer sexual behaviors among rural youth.

4.2.2 Manuscript Introduction

Almost half of all high-school students in the United States are sexually active (Centers for Disease Control and Prevention [CDC], 2010a). Rural adolescents are no exception (Yarber, et al., 2008; Hensel & Anderson, 2006; Milhausen, et al., 2003). Engaging in unprotected intercourse places adolescents at risk for unintended pregnancy and sexually transmitted infections (STIs). Although teen birthrates have decreased nationally (Ventura & Hamilton, 2011), many rural areas continue to report higher than average teen birth rates (Pennsylvania

Department of Health [PADOH], 2010), with rural females identified to be more likely become pregnant during adolescence than those in urban or suburban areas (Atav & Spencer, 2002). Once pregnant, rural youth may face limited access to prenatal services and obstetric care due to the existing shortage of obstetricians and certified nurse midwives in rural areas (National Advisory Committee on Rural Health and Human Services, 2005).

Adolescents are disproportionately affected by many of the most common STIs (CDC, 2011a). Many rural dwellers do not recognize that STIs including HIV may be present in their community (Foster, 2007). However, the prevalence of HIV/AIDS has increased in rural areas, with some rural communities now reporting rates similar to those found in urban areas (Hall, et al., 2005). While STIs including HIV are present in rural regions, services in the rural community for diagnosis and treatment of these infections may be lacking or difficult to access (Ohl, et al., 2010; IOM, 2011). When sexual health services are available, rural youth may not seek needed care due to geographic barriers (Elliott & Larson, 2004) and concerns over maintaining confidentiality in a small community (Gardside, et al., 2002). When limited healthcare resources (CRP, 2004) are combined with the high rates of poverty seen commonly in rural areas (DeNavas-Walt, Proctor, & Smith, 2010), the fiscal burden and negative health outcomes associated with unprotected intercourse may be more strongly felt in the rural community, making prevention a priority.

Condoms are recognized to reduce unintended pregnancy and decrease the transmission of STI when used with every act of intercourse (McKay, 2007; CDC, 2011b). Despite the proven effectiveness of condoms, the level of adolescent condom use has remained relatively unchanged since 2003 (CDC, 2010b). Promoting responsible sexual behavior, which includes condom use, has been identified as a leading health indicator (U. S. Department of Health and

Human Services [HHS], 2000) and remains a priority objective for *Healthy People 2020* (HHS, 2010)*.* Despite comparable levels of sexual risk-taking, condom use research has largely been conducted in non-rural settings with disproportionately few studies in exclusively rural samples (Kirby, 2007; Fahs, et al., 1999).

Research and education related to adolescent condom use may prove challenging in rural areas due to a reduced perception of STI risk (Smith & DiClemente, 2000) increased stigma (Noone & Young, 2009) and geographic barriers (Dreisbach, 2011). As a result of these and other barriers, few data are available related to factors influencing condom use among rural high-school aged youth with comparatively little evidence to elucidate personal, environmental, and behavioral characteristics influencing condom use in this population. To more efficiently design or transfer interventions promoting condom use in rural high-school aged youth more information about the characteristics of condom use in this hard-to-reach population is needed. The purpose of this paper is to identify and describe personal, environmental and behavioral factors that predict condom use among rural youth in grades 9-12 and to suggest implications for school nurse practitioners.

4.2.3 Review of the literature

Research efforts to better understand the antecedents of condom use behavior have received considerable attention in some populations. While roughly one in five adolescents lives in areas identified as rural (National Adolescent Health Information Center, 2003), rural high-school aged youth are disproportionately underrepresented in current research efforts examining the personal, environmental, and behavioral factors related to condom use.

Personal Factors Influencing Condom Use

While knowledge is recognized as necessary for behavior change, instruction on correct condom use is limited, with only one third of high-schools including it in current curricula (Kann, Telljohann, & Wooley, 2007). Widespread misconceptions exist about the correct use of condoms (Crosby & Yarber, 2001). Rural youth may be especially vulnerable to ongoing misperceptions due to the reluctance of rural communities to adopt comprehensive reproductive health education (Stanton, et al., 2005). However, simply increasing knowledge may not reduce in sexual risk-taking in rural communities when other factors are not considered (DiClemente, et al., 1993).

Self-esteem has been shown to vary by gender, with rural adolescent females reporting significantly lower self-esteem than males (Puskar, et al., 2010). The role of self-esteem as it relates to condom use among rural youth is unclear. While factors such as low levels of self-esteem have been qualitatively linked to increased risk-taking in some rural youth (Bell, 2009), they have not been found to be significantly associated with condom use (Chewning, et al., 2001). However, the findings from the Chewning study are recognized to have limited clinical implications, given the use of an exclusively American Indian rural sample.

Theoretically, perception of risk, perceived susceptibility, and negative physical outcome expectations are identified as overlapping constructs represented in commonly used behavioral theories (Bandura, 2004). Worry is identified as a component of these theoretical constructs (Crosby, et al., 2001). While pregnancy may raise concern, rural youth express minimal levels of worry about the possibility of contracting an STI (Puskar, et al., 1999; Yarber & Sanders, 1998). Rural dwellers are less likely to change their current sexual behaviors because of AIDS than those in urban areas (Feinleib & Michael, 1998) and are more likely to believe their partner

to be HIV negative despite a lack of testing (Crosby et al., 2002).   Although worry about pregnancy or STI related to condom use among rural youth is relatively unexplored, worry has been linked to increased condom use in some populations (Kayiki & Forste, 2011; Shafii, et al., 2004).

Central to many health behavior theories (Rosenstock, Stretcher, & Becker, 1988; Bandura, 1986; Prochaska & DiClemente, 1983), self-efficacy, a belief in one's ability to control behavior through action, has been widely studied in adolescent populations using a variety of measures to assess many different aspects of self-efficacy (Alvarez, Villarruel, Zhou, 2010; Villarruel, Jemmott, Jemmott, Ronis, 2007; DiIorio, et al., 2006).   Evaluation of condom use self-efficacy among rural youth is sparse in the published literature, conveying mixed results of overall impact.   Self-efficacy to use condoms (Chewning, et al., 2001) and self-efficacy for sexual negotiation (Pearson, 2006) have been associated with increased condom use among adolescent females, while self-efficacy for using birth control has been shown to increase condom use among all adolescents (Shafii, et al., 2004).   Trials of interventions promoting condom use among rural youth are rare in the current literature. Two such studies integrating self-efficacy in efforts to promote condom use were identified. A peer-led intervention designed for rural youth found increases in both self-efficacy and condom use (Smith & DiClemente, 2000) while adaptation of an intervention to a rural setting improved condom use self-efficacy without impacting actual condom use (Stanton, et al., 2006).

Changes in attitudes, such as those reflecting higher personal standards for condom use, were found to be a strong predictor of condom use among rural Canadian youth (Delaney, et al., 1997) and increase the odds of condom use among sexually experienced males (Manlove, et.al,

2008). However, the latter sample of n=542 youth was selectively drawn from a large national sample, potentially altering rural representativeness.

Environmental Factors Influencing Condom Use

Individual behavior is significantly impacted by the sexual behavior of peers (Ali & Dwyer, 2010). Secondary analysis of a national survey of youth found that friends' condom use behaviors positively influenced individual condom use (Henry, et al., 2007); however, the generalizability of these findings to rural youth may be limited. Conversely, a study among rural youth found that peer norms had no effect on either condom use goals or actual condom use (Delaney, et al., 1997).

Parental communication has been found to influence condom use among adolescents (DiIorio, Pluhar, & Belcher, 2003). Sexually active females who rarely used contraception were less likely to have spoken with their parents about contraception when compared with frequent contraceptors and those who were abstinent (Luster & Small, 1994). Huebner and Howell (2003) found no direct effect of parental communication on sexual risk-taking behavior. However, general communication was examined in this study, and condom use was part of a combined measure of risk-taking, potentially masking the role of communication on condom use alone. While the use of nonspecific measures of communication in lieu of evaluating communication about sexual topics may be acceptable in conservative rural communities, it does not significantly augment the existing evidence and may have limited clinical significance for preventative efforts targeting sexual risk reduction.

Moving beyond basic communication, increasing levels of perceived social support have been positively associated with decreasing some high-risk behaviors among rural adolescents (Hamdan-Mansour, et al., 2007). Close parental connectedness and feelings of caring are

reported to delay sexual onset among very young teens (Sieving, McNeely & Blum, 2000) while supportive friendships have shown no direct impact on sexual risk-taking (Henrich, et al, 2006).

Behavioral Factors Influencing Condom Use

Both alcohol and drug use have been associated with decreased condom use among youth nationally (Santelli, et al., 1998). The likelihood of alcohol use among rural adolescents has been shown to increase with age and grade level (Hamdan-Mansour, et al., 2007). Rural10[th] graders were found to be almost 30% more likely to drink alcohol and 70% more likely to have been drunk than their urban peers (CASA, 2000), with those using alcohol, tobacco and marijuana being three times more likely to become sexually active (Adimora, et al., 2001). Students who used alcohol and/or drugs during a sexual encounter were less likely to have used condoms (Yan, et al., 2007; Dye & Upchurch, 2006; Crosby, et al., 2000). Compounding these risks, when compared to youth nationally, rural dwellers with four or more sexual partners were significantly less likely to use condoms (Crosby, et al., 1998).

In summary, rural youth have rates of risk-taking behavior comparable to those of urban youth. Evidence suggests that knowledge, self-efficacy, peer norms, perceived risk, personal standards for behavior reflected by attitudes and beliefs, self-esteem, goals for condom use, social support, parental communication, and substance use may all influence rural adolescents' condom use behavior. However, the use of limited subsamples from nationally representative studies, the lack of consistency between study measures, and conflicting findings confound interpretation of the clinical significance of these factors. In order to better understand the role of these factors, more research is needed in rural adolescent samples using established measures to help identify predictors of condom use in this population.

4.2.4   Conceptual framework

While this study does not aim to test a theory, it is theory driven. Bandura's (1986) Social Cognitive Theory (SCT) provided the theoretical framework for the selection of predictors examined in this study. Fundamentally, SCT identifies that we are not simply products of our environment; rather, factors in the personal, environmental and behavioral domain(s) interact to shape our behavior. Within these domains, six factors have been put forth for use in the analysis of behavior and development of health promotion efforts (Bandura, 2004). They include knowledge, self-efficacy, outcome expectations, goals, perceived facilitators and impediments.

While knowledge in the form of factual information is necessary to understand why behavior may be detrimental, it is rarely viewed as sufficient to provoke behavior change. However, self-efficacy, specifically the confidence in one's ability to acquire and use condoms, talk with partners about condom use, and refuse unwanted intercourse, is posited to play a central role in individual condom use behavior (Bandura, 1994). Although self-esteem and self-efficacy are distinctly different phenomena, individuals often cultivate self-efficacies which increase their sense of self-worth (Bandura, 1986). These increased feelings of self-worth may translate to increased self-esteem. Motivations for behavior rely strongly on anticipated social, physical, or self-evaluative outcome expectations (Bandura, 2004). In this study, social norms correspond to expected social outcomes, worry reflects anticipated physical outcomes, and personal standards represent self-evaluative outcomes. Other motivations for behavior include goals reflecting the intention for desired behavior. Recognizing that interpersonal relationships

must be considered in matters of sexuality (Bandura, 1994), supportive relationships and open communication are viewed as facilitators of condom use while embarrassment acts as a barrier, reducing the likelihood of condom use.

4.2.5   Purpose

The purpose of this paper is to identify and describe personal, environmental and behavioral factors that predict condom use among rural youth in grades 9 through12. By examining *personal* (knowledge, self-esteem, perceived risk, personal standards, self-efficacy, condom use barriers and condom use goals), *environmental* (social norms, communication with parents, and perceived social support) and *behavioral* (substance use, sexual history, and condom use history) factors, information is provided to reduce gaps in the existing body of evidence and provide a more complete understanding of condom use among rural high-school aged youth.

4.2.6   Methods

Design and Sample

Data for this descriptive, correlational/comparative study were collected as part of a larger cross-sectional study. A nonprobability sampling design was used to recruit participants in the spring of 2011 from adolescents in grades 9-12 drawn from all students enrolled at three school districts in the rural Northeast. Only participants who self-identified as sexually active and provided complete information for the variables of interest were included in the present study. No incentive or promise of remuneration was used in the recruitment process. Eligibility criteria

included: 1) current high school enrollment, 2) age 13 - 19 years, and 3) ability to speak and understand English. The survey was administered by a trained member of the research team during the students' regularly scheduled health, physical education, or homeroom class. The time for completion of the instrument battery was approximately 40 minutes.

The study protocol was approved by the Institutional Review Board (IRB) of the University of Pittsburgh, and letters of support were obtained from participating school districts. A waiver of informed consent was granted due to the low-risk nature of the study.   Although written consent was not required, parents were informed of the survey by mail and provided the opportunity to restrict their child's participation.

4.2.7   Measures

Measures selected were psychometrically sound (Sales, et al., 2009; Sales, et al., 2008; Brenner, et al., 2002; Shrier, et al., 2001; Basen-Engquist, et al., 1999; Zimet, et al., 1990; Robinson, 1973) and used previously in adolescent samples. To evaluate scale reliability in this population, Cronbach's alpha was estimated for all scales using all participants (N=1082) enrolled in the parent study (Table 3).   Measures evaluated knowledge (Shrier, et al., 2001), self-esteem (Robinson, 1973), perception of risk reflected by worry (Sales, et al., 2009), personal standards, self-efficacy for communication, condom use, and refusal of intercourse, condom use barriers, peer norms (Basen-Engquist, et al., 1999), condom use goals (Delaney, et al., 1997), communication with parents about sexual topics (Sales, et al., 2008) perceived support from peers, parents and a significant other (Zimet, et al., 1990), and high-risk behavior (CDC, 2011c).

Additionally, participants reported their age, grade, gender, race, academic performance, family living arrangements, and parents' highest level of education to create a demographic profile.

Table 3 Reliability coefficients for scales measuring personal, environmental, and behavioral variables (N=1082)

Variable	# Items	Reliability
Sexual Knowledge Scale	15	.678
Rosenberg Self-Esteem Scale	10	.895
Worry About Sexual Outcomes	10	.902
WASO-pregnancy	2	.809
WASO-STI	8	.932
Sexual Risk Behavior Beliefs & Self-efficacy Scale		
Self-efficacy Refusing unwanted intercourse	3	.795
Self-efficacy Communicating about condoms	3	.810
Self-efficacy Buying and using condoms	3	.684
Norms for Condom use	3	.902
Barriers for condom use	3	. 790
Personal Standards for condom use	3	.929
Goals for condom use	5	.854
Parent Adolescent Communication Scale	5	.911
Multidimensional Scale of Perceived Social Support	12	.933
MSPSS-significant other	4	.920
MSPSS-friends	4	.926
MSPSS-family	4	.916

Knowledge. Knowledge was defined as factual understanding of information relative to condom use and STI transmission as measured by 15 true/false items such as "condoms must be stored in a cool, dry place." The scale was originally developed to assess knowledge of condom use and STI in high risk adolescent females (Shrier, et al., 2001). Four items were modified in collaboration with Dr. Shrier to construct gender neutral items for this study. Responses were coded (1-correct, 0-incorrect) with higher scores reflecting higher levels of knowledge.

Self-Esteem. Self-esteem was defined as a perception of global self-worth measured by 10 items such as "I have a number of good qualities" and "I wish I could have more respect for myself" using a four-point response scale (1-Strongly agree to 4-Strongly disagree). Five items were reverse scored with higher summative scores reflecting higher levels of self-esteem.

Perceived Risk. Perceived risk was defined as the amount of expressed worry about pregnancy or STI as measured by 10 items such as "In the past 6 months how often did you worry that you might get an STI?" using a four-point response format (1-Never to 4-Always) with higher summative scores reflecting increased levels of worry for each subscale.

Personal Standards. Personal standards help to regulate behavior through self-sanctioning. They are developed over time and are a reflection of personal judgments about how we should behave (Bandura, 1986). To assess personal standards for condom use, three items such as "I believe condoms should always be used if a person my age has sex" were asked. A four-point response (1-definitely yes to 4-definitely no) was used with scores averaged across the number of items.

Self-efficacy. Defined as the belief in our ability to act in a desired manner despite potential obstacles (Bandura, 1986), self-efficacy was measured by three items each for 1) communicating with partners about condom use, 2) acquiring and using condoms, and 3) refusing unwanted intercourse. Items posed sexual scenarios with a three-point response format (1-totally sure to 3-not sure at all). Scores were averaged by the number of scale items with higher scores reflecting higher self-efficacy.

Barriers. Condom use barriers were defined as something real or imagined that prevents condom use identified by three items like "It would be embarrassing to buy condoms in a store." Scale scores were averaged using a four-point response (1-strongly agree to 4-strongly disagree).

Goals. The formation of goals helps to guide current behavior by providing a clear objective. Bandura (2004) puts forth that "intentions are essentially proximal goals" (p. 146). Therefore, goals were defined as expressed short term intention for condom use as measured by five items sharing the common stem "I would use condoms if…" followed by different sexual situations. Items were scored using a five-point response scale (1=always through 5=never). Reverse scoring was used for all items with higher scores reflecting higher goals for condom use.

Peer Norms. Perceived norms for condom use were defined as the participant's perceptions of social pressure to use or not use condoms measured by three items sharing the common stem "Most of my friends believe…" with a four-point response format (1-definitely yes to 4-definitely no). Higher averaged scores reflected norms supporting condom use.

Parental Communication. Parent-adolescent communication was defined as discussion of specific sexual topic areas measured by five items using a four-point Likert response format (1-Never to 4-Often). Designed to assess adolescent girls' frequency of communication about sexual topics with their parents (Sales, et al., 2008) the scale contains a common stem "In the past six months how often have you and your parent(s) talked about…" followed by different sexual topics. In collaboration with Dr. Sales, one gender specific item from the scale was modified so that all items contained in the scale were appropriately gender neutral. Higher summative scores indicate more frequent parental communication.

Social Support. The perception of social support was defined as the extent to which the adolescent identifies the receipt of support and caring from family members, friends, or a significant other as measured by 12 items.   Support from three separate areas (friends, family, and significant other) was assessed with higher mean scores reflecting higher levels of perceived support. The three subscales contained four questions each, such as "I can count on my friends

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when things go wrong" and "My family is willing to help me make decisions." A seven-point Likert response format (1-very strongly disagree to 7-very strongly agree) was used.

Condom use and Sexual Behavior. Condom use at last intercourse has been identified to limit memory error and is a reliable proxy measure for condom use (Younge, et al., 2008). A single item "The last time you had sexual intercourse did you or your partner use a condom?" (yes/no) was used to assess the dependent variable of condom use. To assess the frequency of condom use the item "How often do you and your sexual partner(s) use a condom when you have sexual intercourse?" was included with a five-point Likert type response scale (1=always through 5=never). Sexual history was assessed using a series of single items to evaluate substance use at last intercourse, condom use at first intercourse, non-condom contraceptive use, age at first intercourse, and the number of sexual partners. The latter two items were dichotomized to reflect those 14 or younger at first intercourse and those with four or more sexual partners, respectively.

4.2.8   Data analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 19.0. Descriptive statistics were generated to analyze the demographic characteristics of participants and level of engagement in risk behavior. In screening for missing data fewer than five percent of cases contained a missing value for one of the proposed predictive variables and were removed using listwise deletion. Ten cases retained were noted to have a single missing data point used for descriptive purposes related to family structure (five cases), parental education (two cases), academic performance (two cases), or condom use frequency (one case),

resulting in N=613 cases for analysis. After calculating the initial descriptive statistics for the sample, race was dichotomized (1-white; 2-non-white) for the purposes of further analysis given the relatively homogenous nature of the sample.

Due to non-normality in the distribution of the scaled scores, the Mann-Whitney U test was employed to assess differences between those who used condoms and those who did not, and Spearman's Rho (r_s) correlation was calculated to assess the magnitude of association between the variables of interest. Criteria suggested by Cohen (1988) were used to interpret the strength of the relationship with correlations of .1 considered weak, values of .3 viewed as moderate; and values of .5 or larger identifying variables that were strongly associated.

Variables found to be significantly associated with condom use ($p \leq .05$) were entered into a binary logistic regression model to identify the singular contributions of each variable while adjusting for the influence of other variables in the model. A log10 transformation was conducted for the variable of self-esteem to meet the assumption of linearity in the logit. To assess for multicollinearity, tolerance and VIF values were inspected, and no issues were noted. Potentially influential observations were identified using studentized deleted residuals and leverage statistics; the impact of influence was estimated with Cook's D. After inspection of all potentially influential observations, all cases were retained in the final analysis. In efforts to create a parsimonious model, variables were entered using a backward elimination procedure to avoid omission of predictors involved in suppressor effects. The odds ratio was used to estimate the change in the odds of condom use given a unit of change in the predictor variable. Only predictors identified as significant are included in the final model.

4.2.9 Results

The present study was limited to 613 sexually active adolescents who completed surveys as part

of the parent study. Table 4 outlines the characteristics of the study sample.

Table 4 Demographic characteristics of the sample (N=613)

Characteristic	n	%
Gender		
Female	321	52.4
Male	292	47.6
Race		
White	571	93.1
Black	15	2.4
Hispanic	7	1.1
Asian or Pacific Islander	5	0.8
Native American	6	1.0
Other	9	1.5
Grade Level		
Grade 9	95	15.5
Grade 10	134	21.9
Grade 11	166	27.1
Grade 12	218	35.6
Academic Performance [a]		
Mostly A's and B's	327	53.3
Mostly B's and C's	210	34.3
Mostly C's and D's	64	10.4
Mostly D's and F's	10	1.6
Family Structure[a]*		
Two parents	357	58.2
Female parent only	141	23.0
Male parent only	51	8.3
None of the above	59	9.6
Mothers Educational Level[a]		
Did not finish high school	63	10.3
Graduated from high school	212	34.6
Had some college	95	15.5
Graduated from college	207	33.8
Not sure	35	5.7
Fathers Educational Level[a]		
Did not finish high school	83	13.5
Graduated from high school	260	42.4
Had some college	66	10.8
Graduated from college	146	23.8
Not sure	57	9.3

[a] Sum of total is less than 100% due to item nonresponse
* "Which family member do you live with most of the time?"

Participants were 52.4% female (n=321), largely White (93.1%, n=571), and ranged in age from 14 to 19 years (M=16.39, SD=1.16). Of the sexually active youth surveyed, a large percentage (43.6%) reported engaging in intercourse at age 14 or younger with almost one third of all sexually active youth (32.8%) reporting four or more lifetime partners. At the first episode of intercourse more than 70 percent (71.3%) used condoms; however, less than two-thirds (63.9%, n=392) reported condom use at last intercourse. Nearly half (49.4%, n=303) identified that they always use a condom for intercourse with the remaining half reporting inconsistent or absent condom use. Only 14.7% (n=90) reported using alcohol or drugs before their last episode of sexual intercourse and one in four (24.6%) reported using another method of birth control such as oral contraceptives (OCP) or Depo-Provera. Prevalence of these behaviors is outlined in Table 5.

Table 5 Behavioral Characteristics of the sample (N=613)

Behavior	n	%
Age of first intercourse		
14 or younger	267	43.6
Older than 14	346	56.4
Condom Use at First Intercourse		
Yes	437	71.3
No	176	28.7
Number of Sexual Partners		
4 or more partners	201	32.8
Less than 4 partners	412	67.2
Condom Use[■]		
Yes	392	63.9
No	221	36.1
Substance Use[■]		
Yes	90	14.7
No	523	85.3
Other Contraceptive Use[■▲]		
Yes	151	24.6
No	462	75.4
Frequency of Condom Use[a]		
Always	303	49.4
Usually	90	14.7
Half of the time	35	5.7
Sometimes	88	14.4
Never	96	15.7

[■]At last sexual intercourse
[▲]Birth control pills, Depo-Provera, Nuva Ring, Implanon, or Intrauterine device
[a] Sum of total is less than 100% due to item nonresponse

The differences in the scaled scores used to evaluate the personal, environmental, and behavioral factors of interest are provided in Table 6. Responses to some of the scaled scores differed depending on whether student used condoms or did not. Compared to students who did not use condoms, sexually active students who used condoms had significantly higher levels of knowledge about sexual risk (p=.001), self-esteem (p <.001), personal standards for condom use (p<.001), self-efficacy for condom acquisition and use, partner communication (p<.001), and refusal of unwanted intercourse (p<.001), barriers to condom use (p =.007), condom use goals (p<.001), perceived norms (p <.001) and perceived support from their family (p = .021). Those

who did not use condoms had significantly higher levels of worry about pregnancy (p<.001). Those using condoms reported significantly higher levels of perceived support from their family (*p*=.021) while the perceived level of support received from friends (*p*=.693) or from significant others (*p*=.312) did not differ between those who used condoms and those who did not. No significant differences related to the level of worry about STI (*p*=.253) or the level of communication with parents about sexual matters (*p*=.978) were noted between condom users and those who did not use condoms.

Table 6 Evaluation of differences in the personal, environmental, and behavioral factors between those who use condoms at last intercourse and those who do not (N=613)

	Variable	Condom Use(+) *Mdn(mean rank)* n = 392	Condom Use(-) *Mdn(mean rank)* n = 221	Group Difference			Effect size
Personal	Knowledge	13.0 (325.87)	12.0 (273.52)	U = 36601.0	z = -3.417	p =.001	r= .14
	Self-esteem	22.0 (326.97)	20.0 (271.58)	U = 36021.5	z = -3.650	p <.001	r= .15
	Worry-Preg	3.0 (285.64)	3.0 (344.89)	U = 35569.5	z = -4.038	p <.001	r= .17
	Worry-STI	8.0 (301.78)	8.0 (316.25)	U = 41790.0	z = -1.144	p =.230	r= .05
	Standards	4.0 (376.46)	3.0 (183.80)	U = 16171.0	z = -13.588	p <.001	r= .55
	Self-efficacy, R	2.3 (326.06)	2.0 (273.19)	U = 60925.5	z = -3.514	p <.001	r= .14
	Self-efficacy, C	3.0 (340.56)	2.7 (247.47)	U = 30582.5	z = -6.993	p <.001	r= .28
	Self-efficacy, U	2.7 (330.12)	2.7 (265.99)	U = 34706.0	z = -4.490	p <.001	r= .18
	Barriers	1.6 (321.14)	1.3 (281.93)	U = 48857.5	z = -2.686	p =.007	r= .11
	Goals	25.0 (385.67)	19.0 (167.47)	U = 12662.0	z = -15.244	p <.001	r= .62
Environmental	Peer norms	3.3 (364.12)	2.7 (205.69)	U = 45740.0	z = -10.784	p <.001	r= .44
	PACS	9.0 (307.41)	9.0 (306.28)	U = 43699.0	z = -.028	p =.939	r= .00
	MSPSS-so	6.0 (302.43)	6.3 (315.10)	U = 41644.0	z = -1.01	p =.388	r= .04
	MSPSS-Fr	5.8 (309.48)	5.8 (302.59)	U = 42924.5	z = -.395	p =.641	r= .02
	MSPSS-Fa	5.5 (319.33)	5.3 (285.14)	U = 38896.5	z = -2.297	p =.021	r= .09

To assess the magnitude of association between condom use at last intercourse and its potential correlates, Spearman's rho correlations (r_s) were calculated (Table 7). Each of the variables assessing self-efficacy was found to be significantly correlated with condom use. Of these, self-efficacy for communication about condoms was most closely associated ($r_s = .285$, $p<.001$) followed by self-efficacy for buying and using condoms ($r_s= .183$, $p<.001$) and self-efficacy for refusal of unwanted intercourse ($r_s = .145$, $p<.001$). The strongest associations were noted between actual condom use and the personal variables of goals for condom use ($r_s = .616$) and personal standards for condom use ($r_s=.546$). Norms for condom use ($r_s = .436$) and the use of condoms at the first episode of sexual intercourse ($r_s = .402$) demonstrated a moderately strong positive association with actual condom use at last intercourse. Having four or more lifetime sexual partners ($r_s = -.214$) and the use of other contraception ($r_s=-.178$) were found to be inversely related to condom use. While many individual values were noted to be statistically significant, the strength of association among the remaining variables and condom use at last intercourse was found to be relatively weak, ranging from $r_s = \pm.002$ to $r_s = \pm.168$.

Table 7 Strength of associations between condom use and selected personal, environmental and behavioral factors (N=613)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.Age	1.00																							
2.Gender	.06	1.00																						
3. Race	.06	-.09†	1.00																					
4.Grade	.87*	-.00	.08†	1.00																				
5.Knowledge	.15*	-.16*	.08†	.17*	1.00																			
6. Self-esteem	.11*	.14*	-.03	.13*	.13*	1.00																		
7.Worry-pregnancy	-.00	-.14*	.01	.00	-.04	-.18*	1.00																	
8.Worry-STI	-.11*	-.05	-.08†	-.13*	-.07	-.13*	.24*	1.00																
9.Standards	-.03	-.05	.05	-.03	.25*	.15*	-.11*	-.04	1.00															
10. Self-efficacy R	.10†	-.38*	.14*	.18*	.23*	.09†	-.01	-.11*	.33*	1.00														
11. Self-efficacy C	.05	-.17*	.12*	.08†	.26*	.20*	-.01	-.12*	.42*	.52*	1.00													
12. Self-efficacy U	.17*	.13*	.03	.17*	.08†	.19*	-.03	-.10*	.16*	.17*	.28*	1.00												
13.Barriers	-.09†	-.06	.02	-.07	.07	-.12*	-.02	.03	.10*	.13*	-.02	-.33*	1.00											
14.Goals	-.06	.00	.06	-.05	.26*	.16*	-.14*	-.12*	.72*	.33*	.45*	.16*	.13*	1.00										
15. Norms	-.13*	-.06	.01	-.13*	.17*	.13*	-.09†	-.01	.62*	.26*	.34*	.15*	.04	.57*	1.00									
16.Communication	-.10*	.00	-.02	-.12*	-.09†	.08†	.11*	.09†	.05	-.00	.02	.04	-.07†	-.02	.04	1.00								
17.Support-so	.02	-.21*	.02	.01	.08†	.13*	.10*	-.11*	.03	.20*	.11*	.04	-.03	.06	.06	.06	1.00							
18.Support-friends	-.01	-.18*	.07	.02	.13*	.21*	-.07	-.07	.11*	.15*	.11*	.00	-.04	.12*	.15*	.05	.56*	1.00						
19.Suport -family	.06	.01	.03	.08†	.06	.38*	-.04	-.11*	.15*	.13*	.12*	.12*	-.04	.12*	.11*	.19*	.47*	.50*	1.00					
20.Substance Use	-.02	.07	-.08†	-.06	-.10†	-.02	-.03	.04	-.12*	-.17*	-.13*	-.03	-.08	-.10†	-.11*	-.01	-.05	-.20*	-.05	1.00				
21. First condom	.03	.02	.02	.08†	.16*	.16*	-.08†	-.10†	.29*	.21*	.28*	.21*	.04	.38*	.28*	.01	-.01	.04	.03	-.10†	1.00			
22. Early intercourse	-.35*	.08†	-.10†	-.37*	-.16*	-.02	.02	.13*	-.13*	-.22*	-.13*	-.05	-.12*	-.12*	-.08†	.07	-.10†	-.04	-.05	.17*	-.11*	1.00		
23. Multiple partners	.15*	.05	-.05	.11*	-.16*	-.04	.10*	.12*	-.30*	-.22*	-.15*	.09†	-.29*	-.33*	-.26*	-.00	-.04	-.00	-.05	.18*	-.13*	.29*	.1.00	
24. Contraceptive	.08†	-.17*	.03	.11*	.02	-.03	.04	-.07	-.11*	.13*	.00	.04	-.02	-.16*	-.07	.05	.09†	.00	-.00	-.01	-.02	-.07	.00	1.00
21.Condom Use	-.08†	.14*	-.00	-.08†	.14*	.15*	-.16*	-.04	.54*	.14*	.28*	.18*	.10*	.61*	.43*	.00	-.03	.01	.09†	-.03	.40*	-.06	-.21*	-.17*

Race= white/nonwhite; Standards= Personal standards for condom use; R=self-efficacy to refuse unwanted sex; C= self-efficacy to communicate about condoms; U= self-efficacy to buy and use condos; Barriers =Barriers to condom use; Goals= Goals for condom use; Norms= norms for condom use; so=significant other; Substance use= drug or alcohol use at last intercourse; First condom= condom use at first intercourse; Early coitus= intercourse at ≤14; Multiple partner= ≥4 lifetime sexual partners; Contraceptive = non-condom contraceptive use at last intercourse.   †p<.05; *p<.01.

To better understand the individual contributions of the selected independent variables to the use of condoms at last intercourse, logistic regression analyses were conducted. Table 8 displays the results of the binary logistic analysis for condom use at last intercourse as the dependent variable of interest. The six variable model was found to be significant ($\chi^2(6)$ =334.54, $p<.001$), correctly classifying 89.8% of those who used condoms, with condom use or non-use correctly predicted for 84.3% of adolescents overall. Significant predictors included: age, gender, use of non-condom contraception, condom use at first intercourse, personal standards for condom use, and condom use goals. When all variables are held constant, those who used condoms at first intercourse were identified to be almost four times more likely to use condoms at most recent intercourse (OR=3.93; CI=2.39-6.47). Males were three times more likely to use condoms compared to females (OR=3.17; CI= 1.93-5.21), and with each one unit increase in personal standards score the odds of condom use was found to be almost two and a half times greater (OR, 2.45; CI=1.69-3.67). Likewise, for each one unit increase in goal scores, adolescents were 30% more likely to use condoms (OR=1.32; CI=1.21-1.45) when considering all other variables. However, condom use was 28% *less* likely with each one unit increase in age (OR=.78; CI=.63-.96), and those who used non-condom contraceptives were 85% less likely to use condoms (OR=.54; CI=.32-.89) than those who did not use other methods of birth control.

In considering the interaction of gender and each of the scaled variables, interaction terms were entered in a stepwise fashion to the final block of the regression model. Although, this model was also found to be statistically significant, ($\chi^2(7)$ =343.142, $p<.001$), the added complexity of the significant interaction of personal standards for condom use * gender increased the correct prediction of cases by fewer than one percent calling to question the clinical significance of the finding. The interaction term was therefore eliminated from the final model.

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Table 8 Summary of multivariate logistic regression between condom use at last sex and selected personal, environmental, and behavioral variables (N=613)

Model	-2 LL	χ^2(df)	p	Nagelkerke R^2	Hosmer-Lemeshow $\chi^2(p)$
	466.9	334.5(6)	<.00	.577	6.38(.60)
	B	(SE)	Wald	p	OR	(95% CI)
Age	-.253	.107	5.597	.018	.78	.63-.96
Gender	1.153	.254	20.603	<.001	3.17	1.93-5.21
Non-condom Contraception	-.625	.261	5.729	.017	.54	.32-.89
Condom use at first sex	1.370	.254	29.068	<.001	3.93	2.39-6.47
Personal standards	.911	.198	21.149	<.001	2.45	1.69-3.67
Condom use goals	.280	.045	37.845	<.001	1.32	1.21-1.45

SE= standard error; OR= odds ratio; CI=confidence interval; LL= log liklihood

4.2.10 Discussion

This theory driven study examined the relationships between condom use and several personal, environmental, and behavioral factors among rural high-school adolescents. Prevalence of sexual risk-taking was explored, the strength of the association between variables was examined and predictors of condom use were identified. By providing a more inclusive scope, this study expands the current evidence and provides a more complete understanding of factors influencing condom use among rural high-school aged adolescents than studies examining only the personal (DiClemente, et al., 1993), environmental (Cox, 2006), or behavioral (Yan, et al., 2007; Hensel & Anderson, 2006) domains of influence.

Consistent with previous research (Yarber, et al., 2008; Hensel & Anderson, 2006; Milhausen, et al., 2003), this study provides evidence that rural adolescents are participating in higher than desirable levels of sexual risk-taking including initiating intercourse at an early age, having multiple sexual partners, and using condoms inconsistently. Each of these factors may

contribute to the risk for unintended pregnancy or STI, with adolescent females being especially vulnerable due to an increased biological susceptibility to STIs (Youngkin, & Davis, 2004). Using logistic regression, several personal and behavioral factors emerged as significant predictors of current condom use including age, gender, non-condom contraceptive use, condom use at first episode of intercourse, personal standards, and condom use goals.

Considering the structure of the current health education system and the reluctance of many rural communities to embrace comprehensive sexuality education, these findings support the importance of early intervention to foster health behaviors which may help reduce STI and teen pregnancy. Currently, the largest percentage of instruction related to pregnancy and STI occurs at the high-school level (Kann, et al., 2007). However, this may be too late for many rural youth, considering that 43% of the adolescents in this study reported engaging in intercourse at age 14 or younger. Supporting findings from previous work highlighting the importance of early condom use (Shafii, et al., 2007; Shafii, et al., 2004), this study found that rural youth were almost four times more likely to use condoms at the most recent episode of intercourse if condoms were used at first intercourse.

As seen in other populations (Manlove, et al., 2008; Delaney, et al., 1997), increases in the adolescents' personal standards for condom use significantly predicted actual condom use in this sample of rural youth as did having higher goal for condom use. For adolescent females, however, condom use is recognized to be a negotiated behavior (Robertson, Stein & Baird-Thomas, 2006). Therefore, the predictive value of gender with regard to condom use in this study is not entirely unexpected. Current use of contraceptives such as OCP was also found to significantly lower the odds of condom use at last intercourse highlighting the low perceived risk for STI found in this rural sample and elsewhere (Puskar, et al., 1999; Yarber & Sanders, 1998).

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Concurrent contraceptive use may also help to explain the finding that condom use is less likely with increasing age (OR=.78; CI=.63-.96) given that the use of OCP and other contraception also increased with advancing age. As adolescents are recognized to be inconsistent contraceptors (Committee on Adolescence, 2007), this finding is especially concerning given the endemic nature of many STIs and the unmitigated risk for pregnancy. Therefore, including education regarding the importance of continuing condom use with other contraception would be prudent.

When comparing scores between those who used condoms and those who did not, stratified analyses revealed several differences between groups. Perceived support from friends or significant others did not differ between those who used condoms and those who did not, suggesting that adolescents are likely to associate with friends and/or significant others who are like minded and support their condom use behaviors regardless of the nature of the behavior. Although these findings offer support for the previously identified lack of association between condom use and parental communication (Hubner & Howell, 2003), condom users reported significantly higher levels of perceived support from their family (U-38896.5, $p=.021$), which was found to be weakly associated ($r_s=.093$, $p<.001$) with their condom use behavior.

Given the significant positive associations between self-efficacy and condom use, it is surprising that self-efficacy did not emerge as a significant predictor of condom use in this population. However, given the difficulties faced by the Stanton group (2006) in attempting to replicate an intervention in a rural setting designed for an urban region, these data provide additional evidence to better understand why reported increases in self-efficacy may have been seen without associated increases in actual condom use.

Having ≥ 4 sexual partners was negatively associated with condom use in this sample ($r_s=-.214$, p=.001). This paradoxical finding has been previously reported among samples of

rural youth, although it was found to be nonsignificant among youth nationally (Crosby, et al., 1998). Contrary to previous findings (Yan, et al., 2007; Dye & Upchurch, 2006), alcohol and/or drug use at last intercourse was not significantly associated with the level of condom use in this population. However, it should be noted that a single item was used in this study to assess both alcohol and/or drug use at last intercourse, which may have contributed to these non-significant findings. Additional research among rural youth exploring the individual contributions of various substances may uncover significant influences masked by the combined format.

In summary, considerable evidence supports that adolescents are engaging in unprotected intercourse. Rural youth are no exception. Consistent with current reports (CDC, 2010a), many adolescents, including those in this study, engage in intercourse with multiple sex partners, explore sexual activity at an early age, and use drugs and/or alcohol in conjunction with sexual activity. Recognizing the potential impact of these high-risk behaviors on the health of the individual and the community, data from this study can be used to highlight the prevalence of high-risk behavior in similar communities. With large numbers of students reporting intercourse at age 14 or younger, the timing of reproductive health education must be examined to impact these vulnerable youth before sexual activity has begun. Furthermore, research is needed to evaluate evidence-based interventions using identified predictors of condom use created specifically for rural youth. Findings from this work can be used when designing interventions and gathering support from local school boards, community based collaborative boards, and other educators for the introduction or expansion of interventions aimed at reducing sexual risk-taking among rural high-school aged adolescents.

4.2.11 Limitations

Rural communities vary greatly by geographic region. Although participants were drawn from several different rural communities represented by the participating school districts the sample was relatively homogenous with regard to race, reflecting the demographic of the region. While the process of self-report bears inherent limitations, efforts were made to encourage candid honest responses from all participants. These included providing envelopes to enhance confidentiality and anonymity for questionnaire return, using trained research assistants to administer the questionnaire, and excluding skip patterns in the questionnaires to avoid inference of the presence or absence of behavior to others at the time of data collection. Additionally, the omission of items related to the students personal history of pregnancy or STI and the use of a dichotomous response for the dependent variable of interest may be considered limitations of the current study. However, the collection of personal health information was omitted because it would have created the opportunity for direct identification of individual participants in these small rural communities, potentially resulting in a loss of anonymity.

4.2.12 Implications for school nursing practice

Current recommendations suggest that increased research is needed in rural adolescent populations to promote condom use and safer sexual behavior (RCAP, 2009; CAPS, 2006). Given that many adolescents will become sexually active during high school, school nurses have an important role to play in the prevention of STI and unintended pregnancy. Data from this study supports that rural high-school youth are participating in higher than desirable levels of

high-risk behavior. For sexually active adolescents, The American Academy of Pediatrics (2001) supports consistent condom use and identified that "schools should be considered appropriate sites for the availability of condoms" and that "restrictions and barriers to condom availability should be removed" (p.1467). Consistent with this position, the National Association of School Nurses (2005) identified that school nurses should play a key role in the development and implementation of reproductive health education programs, which may include condom education and distribution in some communities. While the idea of condom distribution in the school setting remains controversial, considerable evidence supports that it does not increase sexual activity and may actually improve rates of condom use (Blake, et al., 2003; Schuster, Bell, Berry & Kanouse, 1998; Wolk & Rosenbaum, 1995).

Although rural communities are often viewed as conservative, little difference exists between rural and urban residents with regard to opinions about condom education, promotion, and distribution in the school setting, with the majority of those surveyed agreeing condom use among sexually active teens is considered responsible behavior (Yarber & Crosby, 2011). School nurses are on the front lines in the effort to reduce teen pregnancy and STI in rural communities. Although abstinence is an unequivocal method of preventing pregnancy and STI, increasing condom use for those who are sexually active should not be overlooked with a special emphasis placed on dual method contraceptive use given the reduced odds of condom use found among rural adolescents using other methods of birth control. The data provided by this study can be used by school nurses to raise awareness of the prevalence of high-risk behavior in the rural community and to help identify those at risk. Additionally, these data can be used as substantiation for development, implementation, and evaluation of evidence-based interventions to increase safer sexual behavior among rural high-school aged youth.

4.3   ADDITIONAL ANALYSES

The purpose of this study is to describe and identify personal, environmental and behavioral factors that predict condom use in rural youth in grades 9-12. Previous sections have described the sample and partial results of Primary Aim 1 & 2 and comprehensive results for Primary Aim 3 submitted in manuscript format. The following sections focus on additional planned analyses not previously described.

4.3.1   Primary Aim 1

To describe the personal, environmental and behavioral factors related to condom use in sexually active rural youth.

RQ 1: Among sexually active rural high-school adolescents in grades nine through twelve, what are the current levels of knowledge, self-esteem, perceived risk, personal standards, self-efficacy, social norms, condom use barriers, goals for condom use, parent-adolescent communication, and social support?

While median values for the scaled variables have been presented in section 4.2.10, Table 9 provides a comprehensive outline of the descriptive scores for all scaled variables. The overall scores for sexual risk knowledge ranged from 1-15 with a mean score of 12.17 (sd=2.22; md=13.0). The highest scores for knowledge were observed for females (M=12.57, sd=1.86, md=13.0) and those in the 12th grade (M=12.68, sd=1.89, md=13.00). Self-esteem scores ranged from 0-30 with a mean of 21.07 (sd=6.60, md=22.0, range 30). Not surprisingly, males (M=22.0, sd=6.48, md=23.00) scored higher than females (M=20.22, sd=6.59, md=20.00) in the area of self-esteem. With a possible score of 2-8, levels of pregnancy worry were found to be

relatively low in this sample with mean scores of 3.28 (sd=1.46, md=3.0). Similarly, levels of worry about STI scores ranged from 8-32 with a mean score of 9.51(sd=3.35, md=8.0), reflecting low levels of overall worry about STIs. Overall, females expressed higher levels of worry for both pregnancy (M=3.64, sd=1.51, md=3.0) and STI (M=9.60, sd=3.48, md 8.0) than males (M=3.08, sd=1.39, md=3.0; M=9.40, sd=3.21, md=8.0, respectively).

Conversely, personal standards for condom use were relatively high among this sample with overall scores ranging from 1-4 (M=3.27, sd=.82, md=3.66) with the lowest average observed scores reported by males in general (M=321, sd=.88, md=3.33). Three dimensions of self-efficacy were measured: refusal of unwanted intercourse, communication about condoms, and condom use. All self-efficacy scales had scores ranging from 1-3. The highest levels of self-efficacy were observed for communication about condoms (M=2.67, sd=.51, md=3.00) with the lowest average scores found in the area of condom use (M=2.60 sd=.46, md=2.66). Females were noted to have higher mean scores for both self-efficacy for communication (M=2.77, sd=.38, md=3.0) and refusal of unwanted intercourse (M=2.42, sd=.56, md=2.66) while males had higher average scores for self-efficacy for condom use (M=2.65, sd=.46, md=3.0).

In examining the scores for condom use norms, those in the 12th grade had the lowest mean scores (M=2.93, sd=.76, md=3.00) with those in the 9th grade having the highest mean scores (M=3.21, sd=.82, md=3.33), indicating a decreasing acceptability of condom use as the student progresses from entry to the high-school setting and graduation. Condom use barrier scores ranged from 1-4 (M=1.78, sd=.75, md=1.66). In evaluating the individual questions, more than one third of those surveyed (34.8%, n=213) indicated that it would be embarrassing to buy condoms in a store while only one fifth (20.8%, n=127) indicated that they would feel uncomfortable carrying condoms, and an overwhelming 82.9% (n=508) disagreed with the

statement that carrying condoms would mean they were planning to have sex. Goals for condom use among this sample of sexually active adolescents were relatively high with scores ranging from 5-25 and a mean score of 21.68 (sd=4.15, md=23.0).

Parent adolescent scores reflected the frequency of communication with parents in the last six months about topics such as sex, how to use condoms, and protecting you from STIs or pregnancy. Scores ranged from 5-20 with mean scores of 10.28 (sd=4.38, md=9.0). The highest levels of communication were observed in those attending 9th grade (M=11.25, sd=4.95, md=11.0) and the lowest levels of parental communication were observed in those enrolled in 12th grade (M=9.50, sd=4.35, md=9.0). The perceived social support received from parents, friends, and a significant other was measured. Scores for all social support scales ranged from 1-7. Of the three measures, the highest levels of perceived support were reported to be received from a significant other (M=5.70, sd=.1.49, md=6.25) while the lowest levels of perceived support were from family members (M=5.11, sd=1.61, md=5.50).

Table 9 Descriptive statistics for selected personal and environmental variables among sexually active youth (N=613)

		Group M (sd) Median n=613	Male M (sd) Median n= 292	Female M (sd) Median n=321	9th grade M (sd) Median n=95	10th grade M (sd) Median n=134	11th grade M (sd) Median n=166	12th grade M(sd) Median n=218
Personal	Knowledge	12.17(2.22) 13.00	11.73(2.49) 12.00	12.57(1.86) 13.00	11.61(2.25) 12.00	11.91(2.55) 12.50	12.05(2.21) 12.00	12.68(1.89) 13.00
	Self-esteem	21.07(6.60) 22.00	22.00(6.48) 23.00	20.22(6.59) 20.00	20.28(7.01) 20.00	19.19(7.03) 20.00	21.87(6.36) 22.00	21.95(6.06) 22.00
	Worry-Pregnancy	3.28(1.46) 3.00	3.08(1.39) 3.00	3.64(1.51) 3.00	3.36(1.58) 3.00	3.35(1.59) 3.00	3.09(1.22) 3.00	3.35(1.49) 3.00
	Worry-STI	9.51(3.35) 8.00	9.40(3.21) 8.00	9.60(3.48) 8.00	10.24(3.30) 8.00	9.92(4.40) 8.00	9.09(2.69) 8.00	9.25(3.02) 8.00
	Standards-condoms	3.27(.82) 3.66	3.21(.88) 3.33	3.34(.76) 3.66	3.33(.86) 3.66	3.23(.92) 3.66	3.29(.81) 3.66	3.27(.75) 3.33
	Self-efficacy- Refusal of unwanted sex	2.16(.68) 2.33	1.88(.68) 1.66	2.42(.56) 2.66	1.97(.60) 2.00	2.08(.68) 2.33	2.16(.71) 2.33	2.30(.65) 2.33
	Self-efficacy-Condom Communication	2.67(.51) 3.00	2.55(.60) 3.00	2.77(.38) 3.00	2.57(.58) 3.00	2.68(.48) 3.00	2.66(.53) 3.00	2.72(.47) 3.00
	Self-efficacy- Condom use	2.60(.46) 2.66	2.65(.46) 3.00	2.55(.46) 2.66	2.43(.52) 2.66	2.57(.45) 2.66	2.62(.45) 2.66	2.64(.43) 3.00
	Barriers to condom use	1.78(.75) 1.66	1.72(.72) 1.66	1.83(.78) 1.66	1.88(.78) 1.66	1.89(.78) 1.66	1.66(.71) 1.66	1.75(.74) 1.66
	Goals for condom use	21.68(4.15) 23.00	21.53(4.55) 23.00	21.81(3.75) 23.00	21.85(4.64) 25.00	21.61(4.11) 23.00	21.74(4.29) 24.00	21.59(3.85) 22.00
Environmental	Norms-condom use	3.06(.79) 3.00	3.00(.79) 3.00	3.10(.78) 3.00	3.21(.82) 3.33	3.08(.83) 3.00	3.12(.75) 3.00	2.93(.76) 3.00
	Parent-Adolescent communication	10.28(4.38) 9.00	10.38(5.09) 9.00	10.19(4.59) 9.00	11.25(4.95) 11.00	10.93(4.96) 10.00	10.22(5.13) 9.00	9.50(4.35) 9.00
	Support-significant other	5.70(1.49) 6.25	5.41(1.53) 5.75	5.96(1.41) 6.50	5.61(1.47) 6.00	5.72(1.47) 6.25	5.78(1.55) 6.25	5.67(1.48) 6.00
	Support-friends	5.46(1.52) 5.75	5.20(1.54) 5.50	5.69(1.46) 6.00	5.34(1.64) 6.00	5.37(1.47) 5.62	5.62(1.45) 6.00	5.43(1.54) 5.75
	Support-family	5.11(1.61) 5.50	5.12(1.62) 5.37	5.09(1.60) 5.50	5.14(1.53) 5.50	4.77(1.58) 4.75	5.20(1.63) 5.62	5.22(1.61) 5.50

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RQ 2: Among sexually active rural high-school adolescents in grades nine through twelve what is the prevalence of condom use?

The overall prevalence of condom use is reported in the manuscript (section 4.2.10). Table 10 outlines the point prevalence of condom use among sexually active youth by grade and gender with the corresponding 95% confidence intervals (CI). Among rural high-school aged youth, the overall prevalence of condom use at last intercourse is 63.9% (CI=60.0-67.6), with males reporting a higher overall prevalence of condom use (71.2%, CI=65.7-76.1) than females (57.3%, CI=51.8-62.6). Condoms were used at the first episode of intercourse by 71.3% (n=437, CI = 67.5-74.4) of those surveyed, with more than 70% of both males and females reporting condom at first intercourse. These data indicate a decline in current condom use from the reported levels of condom use at first intercourse. While this trend is noted for adolescents overall, these declines are most apparent among female respondents.

Table 10 Prevalence of condom use behavior among sexually active youth by grade and gender (N=613)

Condom use at last intercourse							
	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	74.5	60.3-84.8	75.0	61.0-85.2	74.7	65.1-82.4
10	60.5	49.2-70.7	67.2	54.3-77.9	63.4	55.0-71.1
11	54.3	43.5-64.7	72.9	62.6-81.2	63.9	56.3-70.7
12	50.4	41.5-59.3	70.3	60.7-78.3	59.6	53.0-65.9
Total	57.3	51.8-62.6	71.2	65.7-76.1	63.9	60.0-67.6

Condom use at first intercourse							
	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	65.9	51.2-77.8	68.7	54.6-80.1	67.3	57.4-75.9
10	67.1	55.9-76.6	63.7	50.9-74.9	65.6	57.2-73.1
11	75.3	64.8-83.4	69.4	58.9-78.2	72.2	65.0-78.5
12	70.9	62.1-78.4	81.1	72.4-87.7	75.6	69.5-80.9
Total	70.4	65.1-75.1	72.2	66.8-77.0	71.3	67.5-74.7

RQ 3: Among sexually active rural high-school adolescents in grades nine through twelve what is the prevalence of high-risk behavior(s) which may contribute to the acquisition of STI or teen pregnancy?
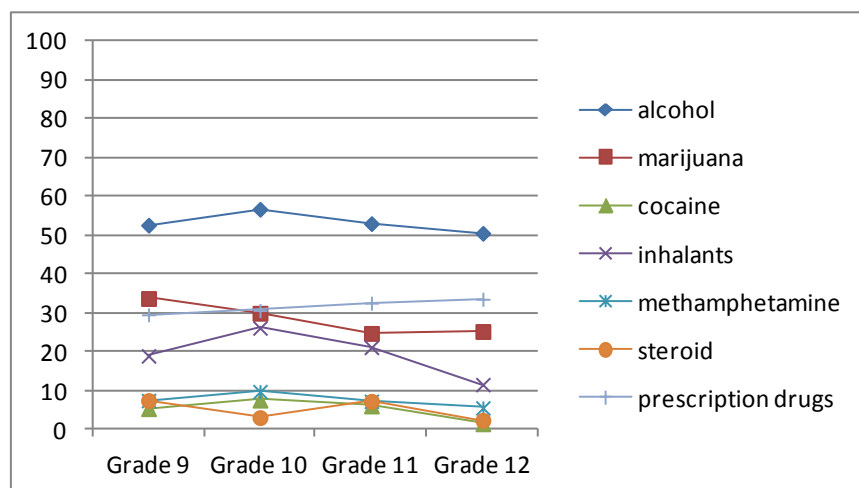
The overall prevalence of substance use and sexual behavior is reported in section 4.2.10. The prevalence of high-risk behavior by grade and/or gender to is presented in greater detail in this section and Appendix E.1.1. Use of alcohol, marijuana, and cocaine in the last 30 days was assessed. Additionally, lifetime use of inhalants, methamphetamine, steroids, and prescription drugs without a doctor's prescription was assessed. In general, males reported higher rates of use for every substance without exception. Figure 4 provides the prevalence of substance use by grade. The most commonly used substance among all grade levels was alcohol with 52.9% (n=324) students reporting alcohol use in the last 30 days. Overall prevalence of substance use demonstrated a general decline between entry to high school in the 9th grade and the senior 12th grade year with the exception of the use of prescription drugs which showed a steady increase across all grade levels.   A detailed table of the point prevalence of assessed behaviors by gender and grade with the corresponding CI is presented in Appendix E 1.1.

Figure 4 Prevalence of substance use among sexually active youth

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Table 11 outlines the point prevalence of sexual behaviors among sexually active youth by grade and gender with the corresponding 95% CI. Of the sexually active youth surveyed, 32.8% (n=201) reported having four or more sex partners in their lifetime. Having multiple partners was slightly more common for males (35.5%, CI=30.0-40.9) than females (30.5%, CI=25.7-35.7), with a general trend demonstrating an increasing prevalence of having four or more sex partners with increasing grade level. Almost half (47.9%, CI= 42.2-53.6) of the sexually active males surveyed reported engaging in their first episode of sexual intercourse when they were 14 years old or younger, with approximately 40 % (CI=34.3-45.0) of sexually active females reporting early onset of sexual intercourse. Only 14.7% (n=90) of those surveyed reported using alcohol or drugs the last time they had sexual intercourse.

Table 11 Prevalence of sexual behaviors among sexually active youth by grade and gender (N=613)

>4 sexual partners						
	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	19.1	10.1-32.7	29.2	18.1-43.2	24.2	16.5-33.7
10	22.4	14.3-33.0	32.8	22.0-45.6	26.9	20.0-34.9
11	32.1	22.9-42.9	38.8	29.1-49.4	35.5	28.6-43.0
12	39.3	30.9-48.3	36.6	27.8-46.3	38.1	31.8-44.6
Total	30.5	25.7-35.7	35.3	30.0-40.9	32.8	29.1-36.6
14 years old or younger at first intercourse						
	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	85.1	72.0-92.9	91.7	79.9-97.2	88.4	80.2-93.5
10	46.1	35.3-57.1	53.4	40.8-65.6	49.3	40.9-57.6
11	32.1	22.9-42.9	36.5	27.0-47.1	34.3	27.5-41.8
12	22.2	15.5-30.6	33.7	25.1-43.3	27.5	22.0-33.8
Total	39.6	34.3-45.0	47.9	42.2-53.6	43.6	39.6-47.5
Alcohol or drug use at last intercourse						
	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	12.8	5.6-25.5	14.6	6.9-27.4	13.7	8.0-22.1
10	18.4	11.1-28.7	22.4	13.4-34.7	20.1	14.1-27.7
11	7.4	3.1-15.5	23.5	15.7-37.1	15.7	10.8-22.0
12	11.1	6.4-18.2	10.9	6.0-18.6	11.0	7.6-15.9
Total	12.1	8.9-16.2	17.5	13.5-22.2	14.7	12.0-17.7

Figure 5 depicts the prevalence of contraception use among those surveyed. Respondents were asked, "The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?" Condoms were reported as the most commonly used method of pregnancy prevention, with those in the 9th grade reporting the highest levels of use and those in the 12th grade reporting the lowest levels of use. In reviewing the findings, a clear pattern of use emerged, with condom use declining as a primary method of pregnancy prevention as birth control use increased. Due to the relatively low rates of Depo, Nuva Ring, IUD, or Implanon use, and the combined format of the item, this item was combined with birth control pill response and recalculated (non-condom contraceptive use [yes/no]) for subsequent analysis.
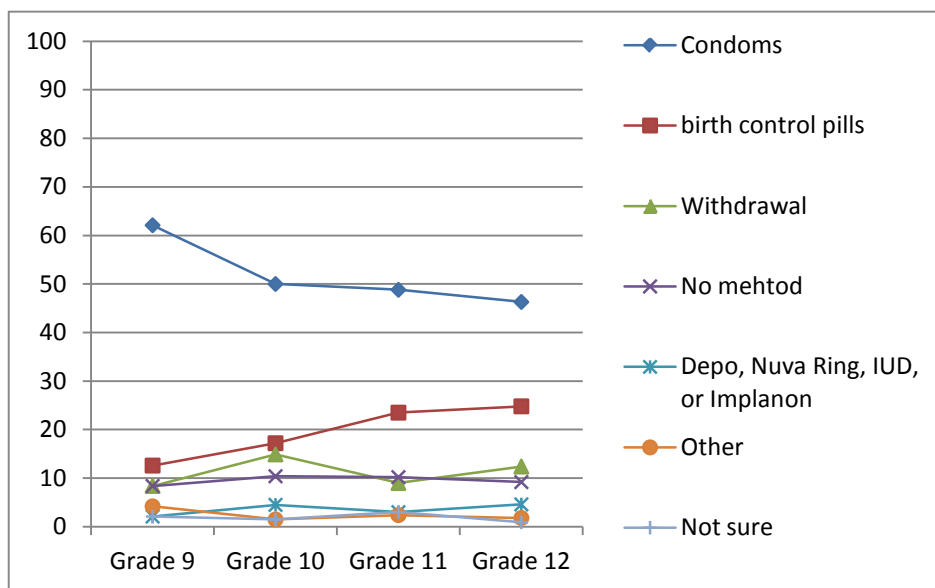
Figure 5 Method of pregnancy prevention at the most recent episode of intercourse.

4.3.2   Primary Aim 2

To compare differences in the personal, environmental, and behavioral factors among sexually active rural youth who currently use condoms and those that do not.

RQ 4: Among sexually active rural high-school adolescents in grades nine through twelve are there significant mean differences in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

Differences among the scaled scores for the **personal and environmental** variables are presented in section 4.2.10. This section summarizes the **behavioral** differences between those who use condoms and those who do not. Due to the low prevalence of select substances, the responses for items assessing substance use were dichotomized (1=use, 0=no use) in order to maintain consistency among factors. Differences among levels of substance use between those who used condoms and those who did not were calculated using crosstabs (Chi-square) analysis. Significant differences in behavior were noted among rural high-school age adolescents who used condoms at the last episode of intercourse and those who did not (Table 12). Adolescents who used condoms at the last episode of intercourse had a higher prevalence of condom use at the first episode of intercourse (p<.001). No differences were noted in the level of recent alcohol use (p=.591) or lifetime steroid use (p=.443) between those who used condoms and those who did not. However, significant differences were found among all other substances examined with those who did not use condoms reporting higher levels of current marijuana use (p=.01), and lifetime use of cocaine (p=.017), inhalants (p=.002), methamphetamine (p=.001), and prescription drugs without a prescription (p<.001). Despite these findings, no differences were noted in the level of drug or alcohol use at last intercourse (p=.398) between those using

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condoms and those who did not. In addition, while no differences in condom use were found for those engaging in intercourse at age 14 or younger (p=.138), those who did not use condoms reported significantly higher levels of engaging in intercourse with four or more sex partners in their lifetime (p<.001).

Table 12 Chi-square analysis for differences in the prevalence of high risk behaviors among sexually active youth between those who use condoms and those who do not (N=613)

		% of Condom users	% of Condom non-users	χ^2	*p*-value
Behavior	Alcohol use*	54.2	52.0	.28	.591
	Marijuana use*	24.2	33.0	5.49	.019
	Cocaine use**	3.0	7.2	5.66	.017
	Inhalants use**	14.7	24.8	9.57	.002
	Methamphetamine use**	4.5	11.7	10.91	.001
	Steroids use**	4.0	5.4	.58	.443
	Prescription drug use**	26.5	41.6	14.81	<.001
	Condom at first sex	84.9	47.0	99.12	<.001
	Other contraceptive use	18.9	34.8	19.40	<.001
	$\geq$ 4 sex partners	25.2	46.1	28.00	<.001
	First sex $\leq$ age 14	41.3	47.5	2.19	.138
	Substance use at last sex†	13.7	16.2	.71	.398

  * Use in the last 30 days
 ** Lifetime use
  †Alcohol or drug use

RQ 5: Among sexually active rural high-school adolescents in grades nine through twelve, are there significant mean differences *by* grade level in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

For those adolescents that did not use condoms at the last episode of intercourse, no significant differences were noted by grade for any substance used (Table 13). Among condom users, no significant differences were noted by grade level in the proportion of alcohol use (p=.617), marijuana use (p=.601), methamphetamine use (p=.246) or prescription drug use (p=.995).

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However, significant differences were noted for those using cocaine (p=.024), inhalants (p=.041) and steroids (p=.044). Fisher's exact test was used for the analysis of differences by grade for cocaine and steroids due to the extremely small cell counts and low prevalence of overall use for these substances and these findings should be interpreted with caution.

Table 13 Chi-square analysis for differences in the prevalence of high risk behavior among sexually active youth by grade level for those who use condoms and those who do not (N=613)

		Condom use at last sex	% of 9th grade students	% of 10th grade students	% of 11th grade students	% of 12th grade students	χ^2	p-value
Behavior	Alcohol use	No	37.5	61.2	56.6	53.4	3.84	.279
		Yes	57.7	54.1	50.9	48.4	1.79	.617
	Marijuana use	No	45.8	36.7	30.0	29.5	2.81	.421
		Yes	29.5	25.8	21.6	22.3	1.86	.601
	Cocaine use*	No	4.1	12.2	10.0	3.4	4.69	.170
		Yes	5.6	4.7	3.7	0.0	8.31	.024
	Inhalants use	No	25.0	32.6	31.6	15.9	6.85	.077
		Yes	16.9	22.3	15.0	8.4	8.25	.041
	Methamphetamine use*	No	8.3	14.2	13.3	10.2	.91	.845
		Yes	7.0	7.0	3.7	2.3	4.01	.246
	Steroids use*	No	4.1	4.0	8.3	4.5	1.27	.799
		Yes	8.4	2.3	6.6	0.7	9.57	.044
	Prescription drug use	No	41.6	36.7	43.3	43.1	.64	.887
		Yes	25.3	27.0	26.4	26.9	.07	.995

*Fisher's exact test used for cell counts <5

Initial data screening revealed that all variables were non-normally distributed to some degree. Given the robust performance of General Linear Modeling (GLM) despite the presence of non-normality, all variables were explored using two-factor GLM to identify whether the effect of grade was dependent on condom use prior to considering non-parametric analysis. In assessing for significant interactions between grade and condom use for individual variables

scores, none was noted (Table 14). Further analyses were conducted using the Kruskal–Wallis test due to violations of the assumptions for parametric methods.

Table 14 Examination of the pattern of differences among sexually active youth in personal and environmental factors by grade for those who use condoms and those who do not using two-factor GLM (N=613)

		Interaction of grade*condom use Significance test = F
Personal	Knowledge	$F(3,605)=.144$, $p = .933$
	Self-esteem	$F(3,605)=2.159$, $p = .092$
	Worry-Pregnancy	$F(3,605)=.799$, $p = .494$
	Worry-STI	$F(3,605)=.089$, $p = .966$
	Standards-condoms	$F(3,605)=1.176$, $p = .318$
	Self-efficacy-Refusal of unwanted sex	$F(3,605)=1.026$, $p = .381$
	Self-efficacy-Condom Communication	$F(3,605)=.125$, $p = .945$
	Self-efficacy-Condom use	$F(3,605)=1.884$, $p = .131$
	Barriers to condom use	$F(3,605)=1.193$, $p = .311$
	Goals for condom use	$F(3,605)=.320$, $p = .811$
Environmental	Norms-condom use	$F(3,605)=2.104$, $p = .099$
	Parent-Adolescent communication	$F(3,605)= 1.946$, $p = .121$
	Support-significant other	$F(3,605)=.209$, $p = .890$
	Support-friends	$F(3,605)=.929$, $p = .427$
	Support-family	$F(3,605)=1.644$, $p = .178$

Significant differences were noted by grade for those who used condoms at last intercourse in the areas of knowledge ($H(3) = 14.036$, $p = .003$), worry about STI ($H(3) = 13.084$, $p = .004$), self-efficacy to refuse unwanted intercourse ($H(3) = 18.792$, $p <.001$), self-efficacy for condom use ($H(3) = 10.838$, $p = .013$), perceived norms for condom use ($H(3) = 10.076$, $p = .018$), and level of communication about sexual matters between parents and adolescents ($H(3) = 13.233$, $p = .004$) (Table 15).

Table 15 Differences in personal and environmental factors among sexually active youth by grade for those who use condoms and those who do not (N=613)

		Students who **did** use a condom at last sex Median score by grade				Group Difference	Students who **did not** use a condom at last sex Median score by grade				Group Difference
		9th n=71	10th n=85	11th n=106	12th n=130		9th n=24	10th n=49	11th n=60	12th n=88	
Personal	Knowledge	12.0	13.00	13.00	13.00	H(3) = 14.036, p = .003	11.50	12.00	12.0	13.0	H(3) = 9.09, p = .019
	Self-esteem	21.00	21.5	23.00	24.00	H(3) = 7.755, p = .051	19.00	16.00	21.0	21.0	H(3) = 14.531, p = .002
	Worry-Pregnancy	3.00	3.00	3.00	3.00	H(3) = 1.959, p = .581	3.00	4.00	3.00	4.00	H(3) = 2.347, p = .504
	Worry-STI	8.00	8.00	8.00	8.00	H(3)= 13.084, p = .004	9.00	8.00	8.00	8.00	H(3) = 10.165, p=.017
	Standards-condoms	4.00	4.00	4.00	4.00	H(3) = .738, p = .864	2.33	2.66	3.00	3.00	H(3) = 2.262, p = .520
	Self-efficacy-Refusal	2.00	2.33	2.33	2.66	H(3) = 18.792, p<.001	1.66	1.66	2.33	2.33	H(3) = 8.413, p=.038
	Self-efficacy- communication	3.00	3.00	3.00	3.00	H(3) = 4.592 p = .204	2.33	2.66	2.66	2.83	H(3) = 4.483, p = .214
	Self-efficacy-Condom use	2.66	2.66	3.00	3.00	H(3) = 10.838, p = .013	2.16	2.66	2.66	2.66	H(3) = 17.008, p =.001
	Barriers to condom use	1.66	1.66	1.66	1.66	H(3) = 3.546, p = .315	2.16	1.66	1.00	1.33	H(3) = 13.189 p = .004
	Goals for condom use	25.0	25.00	25.00	25.00	H(3) = .058, p = .996	17.5	19.0	19.5	19.0	H(3) = .986, p = .805
Environmental	Norms-condom use	3.66	3.66	3.33	3.16	H(3) = 10.076, p = .018	3.00	2.66	2.66	2.66	H(3) = 3.501, p = .321
	Communication	12.00	11.00	8.50	8.00	H(3) = 13.223, p = .004	10.0	9.00	9.50	9.00	H(3) = .392, p =.942
	Support-significant other	6.00	6.25	6.25	6.00	H(3) = 2.470, p = .481	6.12	6.25	6.25	6.25	H(3) = .953, p =.813
	Support-friends	6.00	5.50	5.75	6.00	H(3) = 1.059, p = .787	5.50	5.75	6.00	5.75	H(3) = 3.986, p =.263
	Support-family	5.25	5.25	5.62	5.75	H(3) = 2.945, p = .400	5.50	4.25	5.62	5.25	H(3) = 11.939, p =.008

To further evaluate differences found across grade levels, Mann-Whitney U tests were used to identify the pattern of differences. A Bonferroni correction was applied to control for Type 1 error, and therefore all effects are reported at .008 level of significance. Significant differences by grade level are outlined in Table 16. Condom users in the 9th grade were found to have significantly lower levels of knowledge (p<.001), self-efficacy for refusal of unwanted intercourse (p=.001), and self-efficacy for condom use (p<.001) when compared to condom users in the 12th grade. Additionally, condom users in the 9th grade were found to have significantly *higher* levels of worry about STI when compared to those in the 11th grade (p=.003) and 12th grade (p=.001), respectively. Students in the 12th grade were noted to have significantly *lower* levels of communication with parents about sexual topics when compared individually to those in the 9th grade (p=.003) and 10th grade (p=.003), and significantly *lower* levels of perceived norms supporting condom use when compared to those in the 10th grade (p=.003). No other significant differences were noted between condom users by grade level.

In examining differences between those who did not use condoms at last intercourse, significant differences were noted in the areas of knowledge (H(3) = 9.09, p = .019), self-esteem (H(3) = 14.531, p = .002), worry about STI (H(3) = 10.165, p = .017), self-efficacy for refusal of unwanted intercourse (H(3) = 8.413, p = .038), self-efficacy for condom use (H(3) = 17.008, p = .001), barriers to condom use (H(3) = 13.189, p = .004), and the level of perceived support from family (H(3) = 11.939, p = .008). Further evaluation to assess the pattern of differences identified using a Bonferroni correction to control for Type 1 error found no significant differences by grade among those not using condoms with regard to knowledge or self-efficacy for refusal of unwanted intercourse. However, the largest differences in knowledge were found between those in the 11th and 12th grade (p=.011) and between those in the 10th grade when

compared to 12th grade (p=.023) in the area of self-efficacy for refusal of unwanted intercourse. Those who did not use condoms in the 9th grade were noted to have significantly *higher* levels of worry about STI when compared to those in the 12th grade (p=.004) and significantly *higher* barriers to condom use scores when compared to those in the 11th grade (p=.001). Conversely, condom non-users in the 9th grade had significantly lower levels of self-efficacy for condom use when compared to those in the 11th grade (p=.003) and 12th grade (p<.001), respectively. Those in the 10th grade who did not use condoms reported significantly lower levels of self-esteem when compared individually to those in the 11th grade (p=.001) and 12th grade (p<.001) and significantly lower levels of perceived support from family when compared to those in the 11th grade (p=.003) and 12th grade (p=.003), respectively. No other significant differences were noted between condom non-users by grade level.

Table 16 Significant differences between grade for selected personal, environmental and behavioral variables among sexually active youth for those who use condoms and those who do not (N=613)

| | Condom used at last intercourse | | | | | |
	Grade 9 vs. 10	Grade 9 vs. 11	Grade 9 vs. 12	Grade 10 vs. 11	Grade 10 vs. 12	Grade 11 vs. 12
Knowledge	p=.123	p=.061	*p<.001	p=.802	p=.048	p=.059
WASO-STI	p=.013	*p=.003	*p=.001	p=.943	p=.772	p=.830
Self-efficacy R	p=.043	p=.064	*p<.001	p=.970	p=.024	p=.022
Self-efficacy U	p=.097	p=.015	*p<.002	p=.407	p=.126	p=.578
Norms-condom	p=.817	p=.830	p=.025	p=.555	*p=.006	p=.025
Parental Communication	p=.729	p=.045	*p=.003	p=.056	*p=.003	p=.566
	Condom **not** used at last intercourse					
Knowledge	p=.529	p=.640	p=.020	p=.805	p=.039	p=.011
Self-Esteem	p=.074	p=.383	p=.341	*p=.001	*p<.001	p=.897
WASO-STI	p=.378	*p=.004	p=.022	p=.030	p=.144	p=.401
Self-efficacy R	p=.807	p=.080	p=.029	p=.074	p=.023	p=.894
Self-efficacy U	p=.034	*p=.003	*p<.001	p=.359	p=.036	p=.148
Barriers	p=.057	*p=.001	p=.010	p=.029	p=.276	p=.165
MSPSS-family	p=.020	p=.588	p=.918	*p=.003	*p=.003	p=.662

*significant at $\geq$.008

RQ 6: Among sexually active rural high-school adolescents in grades nine through twelve, are there significant mean differences *by gender* in the personal, environmental, and behavioral factors between those who use condoms and those who do not?

No significant differences were noted between the level of methamphetamine use or prescription drug use by gender for those who use condoms and those who do not (Table 18). However, significant differences were noted among condom users with males reporting significantly higher levels of substance use than females for alcohol (p=.001), marijuana (p=.042), inhalants (p=.039) and steroids (p=.021). Among those who did not use a condom at most recent intercourse, males were noted to have significantly higher levels of marijuana (p<.001) and cocaine (p=.036) use in the last 30 days.

Table 17 Differences in the prevalence of high-risk behavior among sexually active youth by gender for those who use condoms and those who did not at last intercourse (N=613)

		Condom use	% of male students	% of female students	χ^2	p-value
Behavior	Alcohol use	No	57.1	52.5	.44	.506
		Yes	60.0	42.9	11.52	.001
	Marijuana use	No	48.8	23.3	15.29	<.001
		Yes	28.3	19.5	4.11	.042
	Cocaine use	No	11.9	4.3	4.39	.036
		Yes	3.8	2.1	.92	.337
	Inhalants use	No	28.5	22.6	.98	.321
		Yes	18.2	10.8	4.24	.039
	Methamphetamine use	No	11.9	11.6	.00	.960
		Yes	6.2	2.7	2.78	.095
	Steroids use	No	8.3	3.6	2.25	.136
		Yes	6.2	1.6	5.32	.021
	Prescription drug use	No	47.6	37.9	2.00	.157
		Yes	28.3	24.4	.76	.382

In initial data screening all variables were noted to be non-normally distributed. Given the robust performance of General Linear Modeling (GLM) despite the presence of non-normality, all variables were explored using two-factor GLM to identify whether the effect of gender was dependent on condom use prior to the use of non-parametric analysis. Further analyses revealed violations of homogeneity of variance for both self-efficacy for condom communication (Brown-Forsythe, $F(3,609) = 23.182$, $p<.001$) and goals for condom use (Brown-Forsythe, $F(3,609) = 30.053$, $p<.001$). While GLM is fairly robust against violations of homogeneity of variance when sample sizes are equal, it is not considered robust when sample sizes are unequal (Field, 2009), making the findings from this analytic method tenuous. Therefore caution should be used in the interpretation.

In assessing for significant interactions between gender and condom use for individual variables scores, only two of fifteen scales were noted to have significant interactions (Table 18). The pattern of differences on the self-efficacy for communication (SEC) scores among genders was significantly different for those who used condoms and those who did not, $F(1,609)=20.212$, $p<.001$, partial $\eta^2=.032$. In order to find the pattern of differences on SEC scores among genders between those who used condoms and those who did not, simple main effect of condom use was analyzed at each level of gender using simple pairwise comparisons with Sidak-Bonferroni correction for control if familywise Type 1 error rate. There were significant differences on the SEC scores among genders for those who used condoms ($F(1,609)=8.997$, $p=.003$) and those who did not use condoms ($F(1,609)=60.181$, $p<.001$). Females using condoms (n=184, M=2.86, sd=.29) had significantly higher SEC scores than males who used

condoms (n=208, M=2.71, sd=.48). Similarly, females who did not use condoms had significantly higher SEC scores (n=137, M=2.67, sd=.45) than males who did not use condoms (n=84, M=2.16, sd=.71).

The pattern of differences on the goals for condom use scores among genders was significantly different for those who used condoms and those who did not ($F(1,609)=6.230$, $p=.013$, partial $\eta^2=.010$). In order to find the pattern of differences on goal scores between genders between those who used condoms and those who did not, simple main effect of condom use was analyzed at each level of gender. There were no significant differences on the goal scores between genders for those who used condoms ($F(1,609)=2.46$, $p=.117$). However, significant differences on goal scores were noted for those who did not use condoms ($F(1,609)=17.959$, $p<.001$) with females who did not use condoms having significantly higher goal scores (n=137, M=19.15, sd=3.82) than males who did not use condoms (n=84, M=17.21, sd=5.30).

Table 18 Examination of the pattern of differences among sexually active youth in personal and environmental factors by gender for those who use condoms and those who do not using two-factor GLM (N=613)

		Interaction of gender*condom use Significance test = F
Personal	Knowledge	$F(1,609)=3.603$, $p = .058$,
	Self-esteem	$F(1,609)=.001$, $p = .971$
	Worry-Pregnancy	$F(1,609)=.500$, $p = .480$
	Worry-STI	$F(1,609)=490$, $p = .484$
	Standards-condoms	$F(1,609)=2.530$, $p = .112$
	Self-efficacy-Refusal of unwanted sex	$F(1,609)=2.006$, $p = .157$
	Self-efficacy-Condom Communication	$F(1,609)=20.212$, $p < .001$
	Self-efficacy-Condom use	$F(1,609)=2.189$, $p=.140$
	Barriers to condom use	$F(1,609)=.346$, $p = .557$
	Goals for condom use	$F(1,609)=6.230$, $p = .013$
Environmental	Norms-condom use	$F(1,609)=1.411$, $p = .235$
	Parent-Adolescent communication	$F(1,609)= .375$, $p = .541$
	Support-significant other	$F(1,609)=.245$, $p = .621$
	Support-friends	$F(1,609)=.016$, $p = .901$
	Support-family	$F(1,609)=.165$, $p = .684$

In stratified analysis of individual scaled scores by level of condom use and gender, several significant differences were noted (Table 19). Males who used condoms (U=16325.0, 0=.012) and males who did not use condoms (U=4994.0, p=.099) were found to have significantly higher average self-esteem scores when compared to females who used condoms and those who did not, respectively. Additionally, for those students who used a condom at the last episode of intercourse, males were found to have significantly higher levels of self-efficacy for condom use than their female counterparts (U=5974.0, p=.002). In the remaining scores for which significant differences were found by gender, females were noted to have significantly higher scores than males without exception.

Table 19 Differences in personal and environmental factors among sexually active youth by gender for those who use condoms and those who do not (N=613)

	Variable	Students who **did** use a condom at last sex — Median score by gender		Group difference	Students who **did not** use a condom at last sex — Median score by gender		Group Difference
		Male (n=208)	Female (n=184)		Male (n=84)	Female (n=137)	
Personal	Knowledge	13.00	*13.00	U=22250.0; p=.005	11.00	*13.00	U=7611.5; p=<.001
	Self-esteem	*24.00	21.00	U=16325.0; p=.012	*21.00	20.00	U=4994.0; p=.099
	Worry-Pregnancy	2.00	*3.00	U=21502.0; p=.025	3.00	*4.00	U=6658.0; p=.043
	Worry-STI	8.00	8.00	U=20312.0; p=.182	8.00	8.00	U=5764.5; p=.978
	Standards-condoms	3.66	*4.00	U=22944.5; p<.001	2.33	*3.00	U=7134.5; p=.002
	Self-efficacy-Refusal	2.00	*2.67	U=27.803.5; p<.001	1.33	*2.33	U=8850.5; p=<.001
	Self-efficacy-Communication	3.00	*3.00	U=21850.5; p=.003	2.33	*3.00	U=8180.0; p=<.001
	Self-efficacy-Condom use	*3.00	2.67	U=5974.0; p=.002	2.66	2.66	U=5562.5; p=.669
	Barriers	1.66	1.66	U=20922.5; p=.105	1.33	1.66	U=6391.5; p=.152
	Goals	25.00	25.00	U=20938.5; p=.067	18.00	*19.00	U=6867.0; p=.015
Environmental	Norms	3.16	*3.66	U=22558.5; p=.002	2.66	*2.66	U=6759.5; p=.027
	Communication	9.50	9.00	U=18614.0; p=.638	9.00	9.00	U=6058.5; p=.507
	Support-significant other	5.75	*6.50	U=23763.5; p=<.001	6.00	*6.50	U=7191.0; p=.002
	Support-friends	5.50	*6.12	U=23686.5; p=<.001	5.25	*6.00	U=6896.0; p=.012
	Support-family	5.50	5.50	U=18.967.5; p=.880	5.00	5.25	U=5910.5; p=.734

*significantly higher mean rank

4.3.3 Secondary Aim 1

To compare differences in the personal, environmental, and behavioral factors among all rural youth.

RQ 9: Among all rural high-school adolescents in grades nine through twelve, are there significant mean differences by gender or grade level in the personal, environmental, and behavioral factors as they relate to condom use?

To assess differences in behavioral factors between males and females, chi-square analyses were conducted. Findings from these analyses are presented in Table 20. No differences were noted in the level of sexual activity by gender. Males were noted to have higher levels of alcohol and marijuana use in the last 30 days and a higher level of lifetime steroid use when compared to females. No other differences in were noted among the measured behavioral factors.

Table 20 Differences in the prevalence of high-risk behavior among all high-school youth by gender (N=1082)

		% of male students (n=525)	% of female students (n=557)	χ^2(df)	*p*-value
Behavior	History of sexual intercourse	56.2	57.9	.35(1)	.550
	Alcohol use*	40.0	33.2	5.37(1)	.020
	Marijuana use*	21.3	14.0	10.03(1)	.002
	Cocaine use*	3.6	2.0	2.08(1)	.149
	Inhalants use†	14.5	12.6	.84(1)	.358
	Methamphetamine use†	4.3	4.6	.05(1)	.821
	Steroids use†	4.0	1.6	5.69(1)	.017
	Prescription drug use†	21.7	20.3	.332(1)	.564

*use in the last 30 days
†lifetime use

To assess differences in behavioral factors across grade levels, chi-square analyses were conducted. Findings from these analyses are presented in Table 21. No differences were noted across grades for the level of marijuana or cocaine use in the last 30 days, or the prevalence of lifetime methamphetamine or steroid use. Incremental increases by grade were noted for the percentage of students engaging in sexual activity, using alcohol in the last 30 days, or using prescription drugs in their lifetime. These differences were noted to be significant.

Table 21 Differences in the prevalence of high risk behavior among all high-school youth by grade level

		% of 9th grade students (n=271)	% of 10th grade students (n=267)	% of 11th grade students (n=259)	% of 12th grade students (n=285)	χ^2(df)	*p*-value
Behavior	History of sexual intercourse	35.0	50.9	65.2	76.5	108.68(3)	<.001
	Alcohol use*	27.6	35.2	39.7	43.1	15.94(3)	.001
	Marijuana use*	13.2	17.6	17.7	21.4	6.33(3)	.096
	Cocaine use*	1.8	4.4	3.8	1.4	6.67(3)	.083
	Inhalants use	11.9	16.4	16.6	10.5	8.14(3)	.043
	Methamphetamine use	3.6	5.2	4.6	4.5	.764(3)	.858
	Steroids use	2.5	1.8	5.0	1.7	6.78(3)	.079
	Prescription drug use	14.0	19.4	22.0	28.0	17.08(3)	.001

In initial data screening all variables were noted to be non-normally distributed. Given the robust performance of General Linear Modeling (GLM) despite the presence of non-normality, all variables were explored using two-factor GLM to identify whether the effect of gender was dependent on grade level prior to the use of non-parametric analysis for the assessment of differences.

In assessing for significant interactions between gender and grade level for individual variables scores using GLM, only three of sixteen scales were noted to have significant interactions. Table 22 provides information related to the significance of the interactions between gender and grade for each of the scaled scores. The pattern of differences on the personal standards for condom use (SCU) scores among grades was significantly different for males and for females (F(3,1074)=4.55, p=.004, partial η^2=.013). In order to find the pattern of differences on SCU scores among genders between those who used condoms and those who did not, simple main effect of condom use was analyzed at each level of gender using simple pairwise comparisons with Sidak-Bonferroni correction for control if familywise Type 1 error rate. There were significant differences on the SCU scores among grades for females (F (3, 1074)=8.385, p<.001); no differences were noted for males among grades (F(3, 1074)=.858, p=.463). Females in the 9th grade (n=145, M=3.75, sd=.55) had significantly higher SCU scores than females in the 12th grade (n=149, M=3.33, sd=.734, p<.001) and those in the 10th grade (n=145, M=3.49, sd=.77, p=.015), when compared individually.

Similarly, the pattern of differences on the norms for condom use (NCU) scores among grades was significantly different for males and for females (F(3,1074)=2.821, p=.038, partial η^2=.008). Post-hoc analyses revealed significant differences on the NCU scores among grades noted for females (F (3, 1074)=10.041, p<.001) but not males (F(3, 1074)=.621, p=.601). Females in the 12th grade (n=149, M=3.03, sd=.79) had significantly lower NCU scores than females in the 9th grade (n=145, M=3.50, sd=.63, p<.001), 10th grade (n=145, M=3.26, sd=.80, p=.041), and 11th grade (n=149, M=3.29, sd=.60, p=.026) when compared individually.

Lastly, a pattern of differences were noted by grade level and gender for self-efficacy to use condoms (SEUC) scores (F(3, 1074)=2.636, p=.048, partial η^2=.007). Post-hoc analyses

revealed differences for both females ($F(3, 1074)=10.098$, $p<.001$) and males ($F(3, 1074)=10.277$, $p<.001$) across grade levels. The pattern of SECU scores were noted to be significantly lower in the 9th grade when compared to the 10th, 11th, and 12th grade individually for females, and significantly higher in the 12th grade when compared to all other grades individually for males.

Table 22 Examination of the pattern of differences in personal and environmental factors by gender and grade level using two-factor GLM (N=1082)

		Interaction of gender*grade Significance test = F
Personal	Knowledge	$F(3,1074)= 1.28$, $p=.280$
	Self-esteem	$F(3,1074)= 2.31$, $p=.875$
	Worry-Pregnancy	$F(3,1074)= 1.47$, $p=.220$
	Worry-STI	$F(3,1074)= 1.65$, $p=.176$
	Standards-condoms	$F(3,1074)= 4.55$, $p<.004$
	Standards-sexual intercourse	$F(3,1074)= .52$, $p=.666$
	Self-efficacy-Refusal of unwanted sex	$F(3,1074)= 2.36$, $p=.070$
	Self-efficacy-Condom communication	$F(3,1074)= 1.41$, $p=.237$
	Self-efficacy-Condom use	$F(3,1074)= 2.63$, $p=.048$
	Barriers to condom use	$F(3,1074)= .75$, $p=.519$
Environmental	Norms-condom use	$F(3,1074)= 2.81$, $p=.038$
	Norms-sexual intercourse	$F(3,1074)= .471$, $p=.702$
	Parent-Adolescent communication	$F(3,1074)= .34$, $p=.790$
	Support-significant other	$F(3,1074)= .31$, $p=.818$
	Support-friends	$F(3,1074)= 2.03$, $p=.108$
	Support-family	$F(3,1074)= .72$, $p=.540$

In evaluating the non-parametric analysis of differences, females were noted to have significantly higher scores when compared to males for knowledge ($p<.001$), worry about pregnancy ($p=.001$), personal standards for condom use ($p<.001$) and sexual activity ($p<.001$), self-efficacy to refuse unwanted intercourse ($p<.001$) and communicate about condoms ($p<.001$), barriers for condom use ($p=.003$), norms for condom use ($p<.001$) and sexual activity ($p<.001$), parental communication about sexual topics ($p=.037$) and the perceived support of friends ($p<.001$) and a significant other ($p<.001$). Males were noted to have significantly higher levels of self-esteem ($p<.001$) and self-efficacy for condom use ($p<.001$) when compared to females. No differences were noted between gender on scores of Worry about STI ($p=.104$) or the perceived support of family ($p=.592$).

No significant differences were noted between grade levels for scores on self-efficacy to refuse unwanted intercourse ($p=.156$), self-efficacy to communicate about condoms ($p=.667$), level of parental communication about sexual topics ($p=.578$), or the level of perceived support from family ($p=.105$), friends ($p=.810$), or a significant other ($p=.144$). However, a significant difference between grades was noted for all other scaled variables (Table 23).

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Table 23 Evaluation of differences in the personal, and environmental factors by gender and grade level (N=1082)

	Variable	Median score by gender		Group Difference	Median score by grade				Group Difference
		Male (n=525)	Female (n=557)		9th n=271	10th n=267	11th n=259	12th n=285	
Personal	Knowledge	12.00	*13.00	U=165690.0; p=<.001	12.00	12.00	12.00	13.00	H(3)=41.749; p=<.001
	Self-Esteem	*23.00	21.00	U=120469.0; p=<.001	21.00	20.00	22.00	23.00	H(3)=30.172; p=<.001
	WASO-preg	2.00	*2.00	U=161088.0; p=.001	2.00	2.00	2.00	2.00	H(3)=21.679; p=<.001
	WASO-STI	8.00	8.00	U=152499.5; p=.104	8.00	8.00	8.00	8.00	H(3)=16.223; p=.001
	Standard-condom	3.66	*4.00	U=163579.0; p=<.001	4.00	4.00	4.00	3.66	H(3)=18.297; p=<.001
	Standard-sex	2.33	*2.66	U=188694.0; p=<.001	3.00	2.66	2.66	2.66	H(3)=39.903; p=<.001
	Self-efficacy R	2.00	*2.66	U=205820.0; p=<.001	2.33	2.33	2.33	2.66	H(3)=5.220; p=.156
	Self-efficacy C	3.00	*3.00	U=168251.0; p=<.001	3.00	3.00	3.00	3.00	H(3)=3.164; p=.667
	Self-efficacy U	*2.66	2.33	U=123998.5; p=<.001	2.33	2.33	2.66	2.66	H(3)=56.168; p=<.001
	Barriers	2.00	*2.00	U=161273.0; p=.003	2.33	2.33	2.00	1.66	H(3)=50.912; p=<.001
Environmental	Norm-condom	3.00	*3.33	U=168059.5; p=<.001	3.66	3.33	3.00	3.00	H(3)=18.297; p=<.001
	Norm-sex	2.00	*2.33	U=189237.0; p=<.001	2.66	2.33	2.00	2.00	H(3)=39.903; p=<.001
	Communication	7.00	*8.00	U=156786.0; p=.037	8.00	8.00	8.00	7.00	H(3)=1.974; p=.578
	MSPSS-so	5.75	*6.50	U=186661.0; p=<.001	6.00	6.00	6.00	6.25	H(3)=5.415; p=.144
	MSPSS-Fr	5.50	*6.00	U=186346.5; p=<.001	6.00	5.75	5.75	6.00	H(3)=.996; p=.810
	MSPSS-Fa	5.75	5.50	U=148956.5; p=.592	5.75	5.75	5.75	5.75	H(3)=6.113; p=.105

*significantly higher mean rank

To evaluate differences found across grade levels, Mann-Whitney U tests were used to identify the pattern of differences. A Bonferroni correction was applied to control for Type 1 error and therefore all effects are reported at .008 level of significance (Table 24).

Table 24 Differences between grade for selected personal, environmental and behavioral variables (N=1082)

Variable	Grade 9 vs. 10	Grade 9 vs. 11	Grade 9 vs. 12	Grade 10 vs. 11	Grade 10 vs. 12	Grade 11 vs. 12
Knowledge	$p=.164$	$p=.040$	$*p<.001$	$p=.473$	$*p<.001$	$*p<.001$
Self-Esteem	$p=.070$	$p=.020$	$*p=.002$	$*p<.001$	$*p<.001$	$p=.575$
WASO-pregnancy	$p=.229$	$p=.035$	$*p<.001$	$p=.362$	$*p=.001$	$p=.020$
WASO-STI	$p=.078$	$*p<.001$	$*p=.003$	$p=.053$	$p=.267$	$p=.377$
Standards-condom	$*p=.004$	$*p=.003$	$*p<.001$	$p=.955$	$p=.234$	$p=.255$
Standards-sex	$p=.009$	$*p<.001$	$*p<.001$	$*p=.002$	$*p=.005$	$p=.733$
Self-efficacy U	$*p=.003$	$*p<.001$	$*p<.001$	$p=.088$	$*p<.001$	$p=.014$
Barriers	$p=.088$	$*p<.001$	$*p<.001$	$*p<.001$	$*p<.001$	$p=.797$
Goals	$p=.137$	$p=.093$	$*p<.001$	$p=.818$	$p=.025$	$p=.047$
Norms-condom	$p=.013$	$*p=.002$	$*p<.001$	$p=.696$	$p=.015$	$p=.026$
Norms-sex	$*p<.001$	$*p<.001$	$*p<.001$	$*p=.007$	$*p<.001$	$p=.072$

*significant at $\geq.008$

In assessing sexual knowledge scores, those in grade 12 had significantly higher knowledge scores when compared to all other grades individually. Additionally, significant differences are noted between those in grade 9 and those in grade 12 for all variables identified to have significant differences among grades. With significantly higher levels of knowledge, self-esteem, worry about pregnancy, and self-efficacy for condom use noted among 12th graders when compared to 9th graders and significantly lower levels of worry about STI, personal standards and norms for condom use, personal standards and norms for sexual activity, condom use barriers, and goals for condom use noted among 12th graders when compared to 9th graders. Except for the differences noted in knowledge between those in 11th grade and those in 12th grade, no other differences in scaled scores were noted between those in grade 11 and grade 12. There are no other consistent patterns of differences on scores noted between grades.

4.3.4 Secondary Aim 2

To examine the associations among personal, environmental, and behavioral factors and to identify predictors of personal condom use goals in rural high-school youth.

RQ 10: Among rural high-school adolescents in grades nine through twelve, are there differences in the direction or magnitude of association between level of knowledge, perceived risk, personal standards, self-efficacy, self-esteem, condom use barriers, social norms, parental communication, substance use, social support, and personal condom use goals?

To assess the magnitude of association between condom use goals and its potential correlates, Spearman's correlation (r_s) was calculated (Table 25). Surprisingly, only two measures of self-efficacy were found to be significantly correlated with goals for condom use. Of these, self-efficacy for communication about condoms was most closely associated with condom use goals ($r_s = .446$, $p<.001$), and self-efficacy for refusal of unwanted intercourse ($r_s = .375$, $p<.001$) was significant; self-efficacy for condom use was not ($r_s=.036$, $p=.241$). The significant associations between condom use goals and the different dimensions of self-efficacy were noted to be moderate to strong. The strongest bivariate associations were noted between condom use goals and the personal variables of standards for condom use ($r_s = .702$) and norms for condom use ($r_s=.526$). Moderate positive associations were also noted for standards for sexual intercourse ($r_s = .298$), norms for sexual intercourse ($r_s=.218$), and knowledge ($r_s=.200$). Conversely, moderate inverse associations were noted for those with a history of sexual intercourse ($r_s=-.258$), worry about pregnancy ($r_s = -.227$) and the use of drugs (marijuana or cocaine) in the past 30 days ($r_s = .223$). While many individual values were noted to be statistically significant, the strength of association among the other variables of interest and condom use at last sex was found to be relatively weak, ranging from $\pm.051$ to $\pm.199$.

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Table 25 Spearman's Rho correlations between condom use goals and personal, environmental and behavioral factors (N=1082).

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Personal	1.Age	1																					
	2.Grade	.90*	1																				
	3.Gender	.07†	.02	1																			
	4.Hx of sex	.35*	.31*	-.01	1																		
	5.Knowledge	.16*	.18*	-.11*	.09*	1																	
	6.Self-Esteem	.11*	.12*	.15*	-.02	.10*	1																
	7.WASO-preg	.14*	.13*	-.10*	.48*	-.01	-.14*	1															
	8.WASO-STI	-.07*	-.10*	-.04	.15*	-.10*	-.13*	.33*	1														
	9.Standard-condom	-.11*	-.11*	-.11*	-.27*	.18*	.14*	-.20*	-.09*	1													
	10.Standard-sex	-.11*	-.17*	-.25*	-.52*	.02	-.04	-.27*	-.09*	.39*	1												
	11.Self-efficacy R	-.01	.02	-.36*	-.22*	.16*	.08*	-.11*	-.13*	.38*	.45*	1											
	12.Self-efficacy C	.01	.02	-.15*	-.06†	.21*	.17*	-.05	-.12*	.43*	.17*	.49*	1										
	13.Self-efficacy U	.23*	.22*	.13*	.36*	.13*	.16*	.17*	-.00	.06	-.35*	.00	.23*	1									
	14.Barriers	-.20*	-.20*	-.09*	-.42*	-.02	-.12*	-.21*	-.06†	.19*	.49*	.24*	.01	-.49*	1								
Environmental	15.Norm-condom	-.16*	-.15*	-.13*	-.18*	.12*	.13*	-.13*	-.05	.60*	.20*	.26*	.35*	.04	.08*	1							
	16.Norm-sex	-.26*	-.26*	-.25*	-.40*	-.00	-.02	-.19*	.00	.26*	.65*	.35*	.08*	-.31*	.39*	.33*	1						
	17.Communication	-.02	-.04	-.06†	.25*	.03	.05	.20*	.12*	-.00	-.09*	-.03	.01	.14*	-.17*	.01	-.07†	1					
	18.MSPSS-so	.06†	.06†	-.24*	.08*	.12*	.13*	.11*	-.04	.09*	.04	.18*	.13*	.05	-.05	.08*	.00	.09*	1				
	19.MSPSS-Fr	-.02	.00	-.23*	-.02	.13*	.17*	-.04	-.03	.14*	.04	.16*	.13*	.01	-.01	.18*	.04	.05	.56*	1			
	20.MSPSS-Fa	.01	.02	-.01	-.12*	.05	.36*	-.08*	-.09*	.19*	.14*	.18*	.16*	-.00	.03	.13*	.09*	.12*	.47*	.44†	1		
Behavioral	21.Drug use	.09*	.07†	.09*	.29*	-.07†	-.05	.20*	-.11*	-.21*	-.35*	-.20*	-.09*	.11*	-.23*	-.13*	-.30*	.07*	-.06†	-.08*	.15	1	
	22.Alcohol use	.11*	.11*	.07†	.39*	.02	.00	.21*	.07†	-.20*	-.43*	-.22*	-.05	.20*	-.28*	-.09*	-.33*	.09*	-.00	.05	-.09*	.41*	1
	23.Goals	-.12*	-.11*	-.08*	-.25*	.20*	.13*	-.22*	-.16*	.70*	.29*	.37*	.44*	.03	.19*	.52*	.21*	-.05	.06†	.12*	.14*	-.22*	-.19*

†p<.05; *p<.01.

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RQ 11: Among rural high-school adolescents in grades nine through twelve, what are the relative contributions of the personal, environmental, and behavioral factors that significantly predict personal condom use goals?

Due to violations of the assumption of linearity between the outcome variable of condom use goals and posited predictor variables, the planned multiple linear regression could not be conducted. Therefore, the dependent variable of condom use goals was dichotomized to reflect those who endorsed goals of "always" for all items reflecting high goals for condom use (1) and those with less consistent goals for condom use (0). A binary logistic regression was performed between high condom use goals as the dependent variable and the identified personal, environmental, and behavioral variables of interest. Forward, backward, and stepwise elimination were used to identify significant predictors of goals for condom use.

In preliminary analyses, the distribution of scores for both the worry about pregnancy and worry about STI scales were found to be severely skewed with a majority of respondents indicating "never" for all items. For further analyses, these variables were both dichotomized to reflect those who never worried (0) and those who did worry (1). Evaluation of assumption checking revealed violations of the assumption of linearity in the logit for the variables of knowledge and standards for condom use. The variables were transformed using Lg10 transformations to meet this assumption. All other assumptions were met. In the evaluation of outlying data points, 34 cases were outside of $\pm$ 1.96 with 2 cases above $\pm$ 2.58 which is considered acceptable (Field, 2009). In examination of potentially influential data points, Cook's D, DFBeta of the constant, and leverage statistics were examined. No data points were found to have undue influence on the model fit; therefore, all cases were retained in the final analysis.

To assess the potential for the interaction of gender and each of the scaled variables of interest, interaction terms were created and entered in a using a forward entry method in the final block of the model. None of the interactions were noted to be significant and were therefore eliminated from the final model. The final six variable model (Table 26) found significant prediction of high condom use goals by personal standards for condom use, self-efficacy for communication, condom use norms, self-efficacy for refusing unwanted intercourse, and worry about pregnancy or STI, $\chi^2(6)=553.813$, $p<.001$. The final model correctly classified 86.8% of those with high goals for condom use and 80.4% of cases overall.

Personal standards for condom use were found to be the most significant predictor of having high goals for condom use among high-school aged adolescents. When all other variables are held constant the likelihood of having high goals for condom use nine and a half times higher with a one unit increase in standards for condom use score. The odds of having high goals for condom use were 2.1 times higher with each one unit increase in self-efficacy for communication score while a one unit increase in self-efficacy for refusing unwanted sex increased the odds of having high goals for condom use by 38%. Likewise, the likelihood of having high goals for condom use was increased by 80% with a one unit increase in perceived norms for condom use.

However, those who worry about STI are 1.6 times _less likely_ to have high goals for condom use than those who do not worry, and those who worry about pregnancy are 1.7 times _less likely_ to have high condom use goals than those who do not worry about pregnancy. This may be reflective of increased worry generated by prior condom non-use as opposed to worry among sexually naïve respondents. Table 26 presents a summary of the final regression model.

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Table 26 Logistic regression analysis final model summary: Statistically significant predictors of high goals for condom use (N=1082)

Model	-2LL	χ^2(df)	p	Nagelkerke R^2	Hosmer-Lemeshow $\chi^2(p)$	
	937.47	553.81(6)	<.001	.535	11.23(.189)	
					95% CI	
	B	(SE)	Wald	p	OR	lower	upper
Standards for condom use	2.254	.197	130.594	<.001	9.522	6.469	14.014
Self-efficacy - communication	.780	.224	12.110	.001	2.182	1.406	3.386
Norms for condom use	.600	.139	18.597	<.001	1.822	1.387	2.393
Self-efficacy - refusal	.321	.152	4.473	.034	1.379	1.024	1.857
Worry- pregnancy	-.551	.175	9.937	.002	.576	.409	.812
Worry-sti	-.505	.196	6.680	.010	.603	.411	.885

CI=95% Confidence Interval

5.0   CONCLUSIONS

Rural youth may be more strongly affected by condom non-use due to the lack of available healthcare resources in rural areas, reduced access to care due to transportation and financial barriers as well as the lack of acceptability of youth seeking reproductive health services in conservative rural communities. Rural youth are currently underrepresented in the sexual risk taking literature. Interventions to limit sexual risk taking and increase condom use in this population are needed, however, more information is needed in order to design culturally appropriate, age-specific, evidence based interventions for this population. Through the examination of *personal, environmental*, and *behavioral* factors that influence condom use among rural adolescents, information has been gathered to reduce gaps in the existing body of evidence and provide a more complete understanding of condom use among rural high-school aged youth.

This study is felt to provide the foundation for a program of research focusing on increasing the depth of theoretically derived knowledge and empirical evidence that can be applied to reducing the sexual risk-taking behaviors of rural adolescents. In assessing the prevalence of sexual activity and other behaviors, this study confirms previous reports that rural youth are participating in higher than desirable levels of sexual risk taking. These data can be used by nurses and others to raise awareness of the issues facing young people in the rural

community and to justify the introduction of comprehensive sexual education in these communities, starting at grade nine or earlier in efforts to impact students before they become sexually active.

Given the difficulties faced by the Stanton group (2006) in attempting to replicate a successful intervention designed for urban youth in the rural setting, findings from this study which support that self-efficacy for communication with sexual partners and self-efficacy for refusal of unwanted intercourse may play a larger role in overall condom use than that of efficacy for condom use is felt to be clinically significant. In the Stanton et al. (2006) study 90% of conservative rural intervention sites required modification to the intervention, and limited condom demonstration or hands on activities. Findings from this study indicate that focusing on different aspects of efficacy building may be beneficial in both increasing goals for condom use and actual condom use among rural high-school students. Interventions which focus on this type of self-efficacy may also be more acceptable when administered in the rural setting due to the conservative nature of many rural communities.

Most importantly, this study identifies a set of predictors for condom use among rural youth which can be used in the creation of interventions aimed at increasing condom use and reducing sexual risk taking among rural high-school aged adolescents. Targeted interventions which utilize the identified *personal, environmental,* and *behavioral* factors identified by this study which predict rural high-school youth who have high goals for condom use and/or those who currently use condoms may be effective in this population. Lastly, this study provides evidence of the reliability of measures administered for the collection of data when used in rural adolescent samples.

5.1   IMPLICATIONS

5.1.1   Strengths and Limitations

The strengths of this study are the use of a well developed theoretical framework for the selection of study variables, the use of multiple rural school district sites for the collection of data, the high response rate within each data collection site, and the use of a sample size which provided adequate power to detect significant differences among predictors.

Several limitations were noted as well. Rural communities vary greatly by geographic region. Despite the fact that participants were drawn from several different rural communities represented by the participating school districts, the sample was relatively homogenous with regard to race reflecting the demographic of the participating school districts and the larger rural U.S. population. Additional study exploring the personal, environmental and behavioral factors associated with condom use in more racially diverse populations would be appropriate given the diversity of rural populations within the U.S. and abroad.

Because the participants were recruited using nonrandom methods, the generalizability of the study findings is limited to communities possessing similar characteristics. While the process of self-report bears inherent well recognized limitations, including the likelihood of respondents providing socially desirable responses to sexually based questions thereby increasing the potential for response bias, efforts were made to encourage candid honest responses from all participants.   These measures included the use of secure envelopes to enhance confidentiality and anonymity for questionnaire return, using trained research assistants instead of school faculty to administer the questionnaire, and the exclusion of skip patterns (all items may be

answered by all participants) in the survey questionnaires to avoid inference of the presence or absence of behavior to others at the time of data collection. Those who were not currently enrolled in school or present at the time of data collection were excluded from the present study. Individuals that do not attend school due to truancy or drop-out may engage in different rates of risk and/or protective behavior which may not have been captured by the current study.

The measurement level of selected behavioral items may pose additional limitations. Condom use at last intercourse has been identified to be an adequate and acceptable proxy measure of condom use at more distal time points (Younge, et al., 2008); particularly when increasing the number of items may be prohibitive due to time constraints or participant burden. Although commonly used, the use of dichotomous (yes/no) item to assess condom use does not provide the same depth of information as items which identify the frequency of condom use. The use of multiple items that assess frequency of condom use as well as number of episodes of intercourse and number of times condoms were used or not used within a specified time period would have been an appropriate addition to the data collected. This type of measurement would have allowed for verification of information provide by other items and/or the creation of a composite score representing condom use frequency. Furthermore, the data collected contained a single question to assess alcohol or drug use at last intercourse and did not specify the type of alcohol or drug used, which may have contributed to the non-significant associations found in this study. Specifically exploring the contributions of various substances used would allow for assessment of individual influence of these high-risk behaviors which may have been masked by the current combined item format.

Along with many other factors identified in the current literature, a history of STI or pregnancy has been identified to influence condom use in some populations. Failure to include

this variable in the survey items and subsequent analysis may be seen as a limitation of the current study. However, due to the nature of the data collected, the gathering of personal health information related to the prior acquisition of STI or a history of pregnancy may have provided an opportunity for identification of study participants. Loss of confidentiality was identified as one of the primary risks associated with study participation. While measures were taken to protect the confidentiality of the data and the anonymity of the participants, the inclusion of personal health information may have provided unnecessary risk to the participants in the event that individual survey responses were unintentionally disclosed. For example, in a small rural community the responses of a 15 year old female in the 9th grade living with a single parent may be indistinguishable from responses from other participants. However, when information is added to identify that the 15 year old female 9th grade female living with a single parent also has a history of pregnancy; the potential for subject identification is increased thereby increasing the risk associated with study participation.

Finally, the cross-sectional nature of the data collection prohibits the trending of adolescent behavior and limits the assessment of causal direction. However, upon reviewing the findings of the primary and secondary aims, commonalities were noted in identified predictors of condom use among sexually active students and predictors of condom use goals among all students. Further analysis was considered using path analysis to further explore the relationships among the variables. As path analysis is an extension of multiple linear regression, linearity is a foundational assumption. Due to the non-linearity previously identified in the initial assessment of the secondary aims, this analytic approach was not considered feasible for these data.

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5.1.2   Future research directions

Future studies which develop and evaluate theory-driven, evidence-based interventions aimed at increasing protective sexual behaviors, include condom use, among rural adolescents will help to fill a gap in the current research literature. In addition to the development of new interventions, the evaluation of interventions which utilize the identified predictors of condom use behaviors which have been adapted to rural settings is needed. Including randomization of subjects in the design is relatively uncommon in the current literature surrounding condom use among rural adolescents and would help to strengthen the current body of knowledge. Additionally, the use of structural equation modeling (SEM) to explore the causal relationships between variables prior to the construction of interventions was not identified in reviewing the rural adolescent condom use literature. The use of analytic methods such as SEM to better understand the relationships between and among variables of interest prior to intervention construction may also help to strengthen interventions created for this population.

In this study, self-efficacy was not found to be a significant predictor of condom use among sexually active rural youth. However, in examining both sexually active and sexually naïve youth in combination, two different aspects of self efficacy (refusal of unwanted intercourse, communication with sex partners about condom use) were found to predict those having high goals for condom use which in turn predicted actual condom use. Building upon the findings of this study, future study which includes complex analytic methods to evaluate causal relationships such as SEM may help to further illuminate the individual contribution of key variables thereby strengthening future intervention design.

Interventions aimed at promoting responsible sexual behavior in adolescents typically educate both those who are sexually active and those who have not yet become sexually active. Information was generated by this study relevant to both of these segments of the rural adolescent population. This study did find significant differences between those who were sexually active and those who were not with regard to age, academic performance, and family structure. These findings were noted to be consistent with previous research. While not included in the specific aims for this study, the identification of other specific characteristics of rural youth who are not sexually active, particularly their views toward condom use and personal goals for condom use would be a beneficial addition to the current research literature. Further examination of those who are not engaging in sexual intercourse may provide additional insight for the construction of interventions to be delivered in the general high-school setting and should be considered. Additionally, the findings from this study support that while males may be less impacted by the enhancement of personal standards for condom use than females, they will still be significantly affected. This suggests that interventions created and tested in this population should target adolescents, both male and female, rather than striving to create gender specific interventions.

Future studies which develop and evaluate theory-driven, evidence-based interventions aimed at increasing protective sexual behaviors, including condom use, among rural adolescents are needed and will help to fill a gap in the current research literature. In this study, personal standards for condom use predicted both actual condom use and those having high goals for condom use while goals for condom use (the dependent variable for the secondary aims) emerged as a predictor of actual condom use. Additionally, each of the variables identified to predict those having high goals for condom use were noted to be significantly correlated with

actual condom use among sexually active participants indicating some degree of influence on this outcome as well. Therefore, findings from both the primary and secondary aims should be used to create interventions for rural youth aimed at the general high-school aged population.

Extending the theoretical framework to the design of interventions promoting condom use would be suggested. In the construction of an intervention, identified *personal* predictors suggest that interventions should be introduced early, at or before the ninth grade, and focus on the enhancement of personal standards for condom use as well as helping students to set personal goals for condom use. Findings suggest that intervention activities could be created to augment the student's perceived self-efficacy for communicating with partners about condom use as well as efficacy for the refusal of unwanted intercourse to influence the level of overall condom use. Considering the identified *environmental* predictors, peer educators are likely to be beneficial. They could be utilized in both the delivery of the intervention and the construction of intervention activities. In integrating the identified *behavioral* predictors, it is suggested that education efforts which address the use of dual method contraception for those currently using or considering alternative forms of birth control would be prudent to enhance current condom use.

Lastly, due to the cross-sectional nature of the present study, causal inference limited. There is not a satisfactory empirical understanding of worry about STI or pregnancy and its impact on condom use in rural high-school adolescents. Future qualitative exploration or longitudinal examination of the role of worry as it relates to condom use may help to enhance understanding of the influence of worry of the use of condoms in low HIV risk populations.

5.1.3   Implications for global health

Globally, 49% of the population lives in areas identified as rural (World Bank, 2012). A more complete understanding of the antecedents of condom use is a necessary component of designing effective interventions to increase condom use among rural adolescent populations around the world. While rural communities are undeniably diverse, many features are common to rural living. Rural dwellers frequently score lower on key measures of health when compared to urban or suburban areas. Issues of availability, access and acceptability underlie many reported healthcare disparities found in rural areas.

Rural communities are often geographically and socially isolated with elevated rates of poverty. Lack of access to transportation including public transportation may further limit the utilization of services due to the increased geographic distances between necessary resources in areas of low population density. These common characteristics of rural life are not defined by the geographic boundaries of the U.S.; they are shared globally. Similarly, protecting adolescents from the potentially negative consequences of unprotected intercourse, specifically unintended pregnancy and the acquisition of STI is not a healthcare goal unique to the United States.

Recognizing that evidence-based interventions are most effective when designed for specific populations, the findings from this study may be used by those in rural communities in other developed nations who share similar population characteristics in their efforts to create targeted interventions aimed at improving rates of condom use among rural adolescents. In addition to the identification of predictors for condom use behaviors, factors were identified that can assist nurses and other healthcare providers globally in the justification of early intervention in efforts to develop patterns of protective sexual behaviors among rural adolescents.

APPENDIX A

IRB

A.1.1 IRB Approval

From: irb@pitt.edu
Sent: Wednesday, December 22, 2010 4:09 PM
To: Haley, Tammy Michelle
Subject: PI Notification: Your research study received approval under expedited review

University of Pittsburgh
Institutional Review Board

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu

Memorandum

To: Tammy Haley, RN, MSN, APRN-BC

From: Christopher Ryan, PhD, Vice Chair

Date: 12/22/2010

IRB#:   PRO10110258

Subject: Personal, Environmental, & Behavioral Factors Influencing Condom Use in Rural Youth

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The University of Pittsburgh Institutional Review Board reviewed and approved the above referenced study by the expedited review procedure authorized under 45 CFR 46.110. Your research study was approved under 45 CFR 46.110 (7).

The IRB has determined the level of risk to be minimal.
The IRB has granted a waiver of informed consent.

Approval Date: 12/22/2010
Expiration Date: 12/21/2011

For studies being conducted in UPMC facilities, no clinical activities can be undertaken by investigators until they have received approval from the UPMC Fiscal Review Office.
Please note that it is the investigator's responsibility to report to the IRB any unanticipated problems involving risks to subjects or others [see 45 CFR 46.103(b)(5)]. The IRB Reference Manual (Chapter 3, Section 3.3) describes the reporting requirements for unanticipated problems which include, but are not limited to, adverse events. If you have any questions about this process, please contact the Adverse Events Coordinator at 412-383-1480.
The protocol and consent forms, along with a brief progress report must be resubmitted at least one month prior to the renewal date noted above as required by FWA00006790 (University of Pittsburgh), FWA00006735 (University of Pittsburgh Medical Center), FWA00000600 (Children's Hospital of Pittsburgh), FWA00003567 (Magee-Womens Health Corporation), FWA00003338 (University of Pittsburgh Medical Center Cancer Institute).

A.1.2 IRB Renewal

<table>
<tr><td></td><td style="text-align:center">University of Pittsburgh
<i>Institutional Review Board</i></td><td>3500 Fifth Avenue
Pittsburgh, PA 15213
(412)   383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu</td></tr>
</table>

<u>Memorandum</u>

To: Tammy Haley, RN, MSN, APRN-BC

From: Sue Beers, PhD, Vice Chair

Date: 12/12/2011

IRB#:   REN11090222 / PRO10110258

Subject: Personal, Environmental, & Behavioral Factors Influencing Condom Use in Rural Youth

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Your renewal for the above referenced research study has received expedited review and approval from the Institutional Review Board under: **This approval is for analysis of data only.**

45 CFR 46.110.(7) characteristics/behaviors

Please note the following information:

Approval Date: 12/12/2011
Expiration Date: 12/21/2012

Please note that it is the investigator's responsibility to report to the IRB any unanticipated problems involving risks to subjects or others [see 45 CFR 46.103(b)(5) and 21 CFR 56.108(b)]. The IRB Reference Manual (Chapter 3, Section 3.3) describes the reporting requirements for unanticipated problems which include, but are not limited to, adverse events. If you have any questions about this process, please contact the Adverse Events Coordinator at 412-383-1480.

The protocol and consent forms, along with a brief progress report must be resubmitted at least **one month** prior to the renewal date noted above as required by FWA00006790 (University of Pittsburgh), FWA00006735 (University of Pittsburgh Medical Center), FWA00000600 (Children's Hospital of Pittsburgh), FWA00003567 (Magee-Womens Health Corporation), FWA00003338 (University of Pittsburgh Medical Center Cancer Institute).

APPENDIX B

INSTRUMENTS

B.1.1 Demographic Form

Instructions: **Please answer the following questions. Indicate your response by filling in the circle next to the appropriate answer or writing your response (as a number) in the box provided.**

1. How old are you?

    O 13 years old

    O 14 years old

    O 15 years old

    O 16 years old

    O 17 years old

    O 18 years old

    O 19 years old

    O 20 years old or older

2. What is your grade?

    O 9th grade

    O 10th grade

    O 11th grade

    O 12th grade

3. What is your gender?

    O Male

    O Female

4. Please indicate which family members you live with most of the time?

    O Both parents- including a stepmother or stepfather
    O Mother or stepmother only
    O Father or stepfather only
    O None of the above

5. What is the highest level your father or stepfather completed in school?

    O He did not finish High School
    O He graduated from High School
    O He had some College
    O He graduated from College
    O Not sure

6. What is the highest level your mother or stepmother completed in school?

    O She did not finish High School
    O She graduated from High School
    O She had some College
    O She graduated from College
    O Not sure

7. What is your race?

    O White –not Hispanic
    O Black- not Hispanic
    O Hispanic
    O Asian or Pacific Islander
    O Native American or Alaskan Native
    O Other-specify_____

8. What kind of grades do you usually get in school?

    O Mostly A's and B's (90's and 80's)
    O Mostly B's and C's (80's and 70's)
    O Mostly C's and D's (70's and 60's)
    O Mostly D's and F's (60's and lower)

B.1.2 Sexual Risk Knowledge Scale (Shrier, et al., 2001) Adapted with permission

The next fifteen questions ask what you know about sexually transmitted diseases and their prevention. To indicate your response, please circle true or false for each statement

1. Sexually transmitted diseases can lead to problems as serious as chronic pelvic pain, infertility, and even death. **True False**

2. Lambskin condoms and latex condoms are equally protective against sexually transmitted diseases. **True False**

3. Vaseline is as good a Nonoxonyl-9 for killing sperm. **True False**

4. Space should be left at the tip of a condom when it is put on the penis. **True False**

5. To best prevent sexually transmitted diseases, when you have sex you should use two condoms instead of just one. **True False**

6. When you or your sexual partner uses a condom, you/he should unroll it first and then slip it on. **True False**

7. Even if you know your sexual partner really well, you need to use a condom when you have sex. **True False**

8. You can use any lubricant, including massage oil or Vaseline, during sex to help prevent condoms from breaking. **True False**

9. If the condom package has not been opened or damaged, the condom can be used at any time, even 5 or 10 years from now. **True False**

10. If you or your partner uses a hormonal method of birth control like the Pill or the Depo-Provera shot, you still need to use condoms. **True False**

11. If you douche right after having sexual intercourse, you won't get a sexually transmitted disease. **True False**

12. If you don't have abdominal pain or an abnormal discharge from your penis or vagina, you don't have a sexually transmitted disease. **True False**

13. Condoms must be stored in a cool, dry place. **True False**

14. If you have a sexually transmitted disease such as Chlamydia or gonorrhea, your sexual partner needs to be treated only if he or she has symptoms. **True False**

15. If the condom doesn't break, it is okay to re-use it for the next sexual act. **True False**

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B.1.3 Rosenberg Self-Esteem Scale (Robinson, 1973)

Instructions: Below is a list of statements dealing with your general feelings about yourself. Fill in the circle next to the answer that most closely tells what you think about the statement.

1. On the whole, I am satisfied with myself.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

2. At times, I think I am no good at all.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

3. I feel that I have a number of good qualities.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

4. I am able to do things as well as most other people.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

5. I feel I do not have much to be proud of.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

6. I certainly feel useless at times.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

7. I feel that I'm a person of worth, at least on an equal plane with others.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

8. I wish I could have more respect for myself.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

9. All in all, I am inclined to feel that I am a failure.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

10. I take a positive attitude toward myself.
    I strongly disagree   I kind of disagree   I kind of agree   I strongly agree
          O   O   O   O

B.1.4 **Intention to Use Condoms Scale** (Delaney, Langille, Richardson, Beazley, 1997)

1. I would use condoms if I had sex with a steady sexual partner

    never   rarely   unsure   sometimes   always
    O   O   O   O   O

2. I would use condoms if I had sex with someone who told me that he/she didn't have a sexually transmitted disease (STD)

    never   rarely   unsure   sometimes   always
    O   O   O   O   O

3. I would use condoms if I had sex with someone who had been having sex with other people

    never   rarely   unsure   sometimes   always
    O   O   O   O   O

4. I would use condoms if I had sex with someone I didn't know very well

    never   rarely   unsure   sometimes   always
    O   O   O   O   O

5. I would use condoms with all sexual partners

    never   rarely   unsure   sometimes   always
    O   O   O   O   O

B.1.5 Parent-Adolescent Communication Scale (Sales, et al., 2008). Adapted with permission.

In the past 6 months how often have you and your parent(s) talked about the following things:

	Never	Rarely	Sometimes	Often
1. Sex	O	O	O	O
2. How to use condoms	O	O	O	O
3. Protecting yourself from sexually transmitted diseases (STD's)	O	O	O	O
4. Protecting yourself from the AIDS virus	O	O	O	O
5. Protecting yourself from becoming pregnant	O	O	O	O

B.1.6   Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, Farley,

1988).

Instructions: We are interested in how you feel about the following statements.   Read each statement carefully.   Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
Circle the "2" if you **Strongly Disagree**
Circle the "3" if you **Mildly Disagree**
Circle the "4" if you are **Neutral**
Circle the "5" if you **Mildly Agree**
Circle the "6" if you **Strongly Agree**
Circle the "7" if you **Very Strongly Agree**

	Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1. There is a special person who is around when I am in need.	1	2	3	4	5	6	7
2. There is a special person with whom I can share joys and sorrows.	1	2	3	4	5	6	7
3. My family really tries to help me.	1	2	3	4	5	6	7
4. I get the emotional help & support I need from my family.	1	2	3	4	5	6	7
5. I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
6. My friends really try to help me.	1	2	3	4	5	6	7
7. I can count on my friends when things go wrong.	1	2	3	4	5	6	7
8. I can talk about my problems with my family.	1	2	3	4	5	6	7
9. I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
10. There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
11. My family is willing to help me make decisions.	1	2	3	4	5	6	7
12. I can talk about my problems with my friends.	1	2	3	4	5	6	7

B.1.7 Behavior (CDC, 2011c)

Instructions: Read each statement carefully and indicate your answer by filling in the circle next to the response.

The next 2 questions ask about drinking alcohol. This includes drinking beer, wine, wine coolers, and liquor such as rum, gin, vodka, or whiskey. For these questions, drinking alcohol does not include drinking a few sips of wine for religious purposes.

1. How old were you when you had your first drink of alcohol other than a few sips?

O   I have never had a drink of alcohol other than a few sips
O   8 years old or younger
O   9 or 10 years old
O   11 or 12 years old
O   13 or 14 years old
O   15 or 16 years old
O   17 years old or older

2. During the past 30 days, on how many days did you have at least one drink of alcohol?
O   0 days
O   1 or 2 days
O   3 to 5 days
O   6 to 9 days
O   10 to 19 days
O   20 to 29 days
O   All 30 days 11

The next 6 questions ask about marijuana and other drug use. Marijuana also is called grass or pot.

3. During the past 30 days, how many times did you use marijuana?
O   0 times
O   1 or 2 times
O   3 to 9 times
O   10 to 19 times
O   20 to 39 times
O   40 or more times

4. During the past 30 days, how many times did you use **any** form of cocaine, including powder, crack, or freebase?
O   0 times
O   1 or 2 times
O   3 to 9 times
O   10 to 19 times
O   20 to 39 times
O   40 or more times

5. During your life, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?
O   0 times
O   1 or 2 times
O   3 to 9 times
O   10 to 19 times
O   20 to 39 times
O   40 or more times

6. During your life, how many times have you used **methamphetamines** (also called speed, crystal, crank, or ice)?
O   0 times
O   1 or 2 times
O   3 to 9 times
O   10 to 19 times
O   20 to 39 times
O   40 or more times

7. During your life, how many times have you taken **steroid pills or shots** without a doctor's prescription?
O   0 times
O   1 or 2 times
O   3 to 9 times
O   10 to 19 times
O   20 to 39 times
O   40 or more times

8. During your life, how many times have you taken a **prescription drug** (such as OxyContin, Percocet, Vicodin, codeine, Adderall, Ritalin, or Xanax) without a doctor's prescription?
O   0 times
O   1 or 2 times
O   3 to 9 times
O   10 to 19 times
O   20 to 39 times
O   40 or more times

The next 7 questions ask about sexual behavior.

9. Have you ever had sexual intercourse?

O   Yes
O   No

10. How old were you when you had sexual intercourse for the first time?

O I have never had sexual intercourse
O 11 years old or younger
O 12 years old
O 13 years old
O 14 years old
O 15 years old
O 16 years old
O 17 years old or older

11. During your life, with how many people have you had sexual intercourse?

O I have never had sexual intercourse
O 1 person
O 2 people
O 3 people
O 4 people
O 5 people
O 6 or more people

12. During the past 3 months, with how many people did you have sexual intercourse

O I have never had sexual intercourse
O I have had sexual intercourse but not in the past 3 months
O 1 person
O 2 people
O 3 people
O 4 people
O 5 people
O 6 or more people

13. Did you drink alcohol or use drugs before you had sexual intercourse the **last time**?

O I have never had sexual intercourse
O Yes
O No

14. The **last time** you had sexual intercourse; did you or your partner use a condom?

O I have never had sexual intercourse
O Yes
O No

15. The **last time** you had sexual intercourse, what **one** method did you or your partner use to **prevent pregnancy**? (select only **one** response)

O I have never had sexual intercourse
O No method was used to prevent pregnancy
O Birth control pills
O Condoms
O Depo-Provera, Nuva Ring, Implanon, or any IUD
O Withdrawal
O Some other method
O Not sure

APPENDIX C

INSTRUMENTS: APPROVAL FOR USE

C.1.1   Permission to use Sexual Risk Knowledge Scale

From: Shrier, Lydia
To: Haley, Tammy Michelle
Cc: Shrier, Lydia
Subject: RE: request
Date: Tuesday, May 01, 2012 2:17:44 PM

Hi, Tammy, you may include the scale items in your dissertation appendix under the following
conditions: Permission is hereby granted for you to reprint the retained original scale items and the amended gender
neutral items (collectively, the "materials") in the Appendix of your dissertation as detailed below, for the purposes
set forth below; provided, however, that the Children's Hospital Boston copyright symbol must be included on all
replications and copies of the materials and may not be altered or removed from the materials or from any
replications or copies thereof.

Please let me know if you have any questions. Congratulations on your PhD!
Lydia Shrier

-----Original Message-----
From: Haley, Tammy Michelle [mailto:tmh24@pitt.edu]
Sent: Friday, April 27, 2012 9:58 AM
To: Shrier, Lydia
Subject: RE: request

Dr. Shrier,
I do not know if you remember me. I was a student working on my PhD at the University of Pittsburgh and I had
asked for permission to use items measuring sexual risk knowledge that were detailed in the publication
Reproductive Health Education and Sexual Risk Among High-Risk Female Adolescents and Young Adults
published in the Journal of Pediatric and Adolescent Gynecology (2005) 18:105-111 in the collecting of data for my
dissertation research. Given that the study included males and females you worked with me to create gender neutral
items to allow for use in this population. At that time I neglected to inquire specifically about the possibility of
including the scale items used in the Appendix of my dissertation work.

I recognize that the original items were copyrighted by Children's Hospital Boston with permissions for use to be
directed to the Director, Safer Sex Intervention, Division of Adolescent/Young Adult Medicine. Therefore, I am
writing at this time to ask your permission to reprint the retained original scale items and the amended gender
neutral items in the Appendix of my dissertation. The requested permission extends to any future revisions and
editions of my dissertation, including non-exclusive world rights in all languages, to the electronic publication of my
dissertation by the University of Pittsburgh, and to the prospective publication of my dissertation by ProQuest.
ProQuest may supply copies of my dissertation on demand. These rights will in no way restrict republication of the
material in any other form by you or by others authorized by you. Your approval of this request will also confirm
that you own [or your company owns] the copyright to the above-described material.
If you are agreeable to allowing me to include the scale items, please respond with a confirmatory statement
indicating that I may include the identified items in the Appendix of my dissertation work.

Thank you very much for considering this request.
Sincerely,
Tammy M. Haley RN, PhD
Assistant Professor of Nursing
RN-BSN Program Coordinator
University of Pittsburgh at Bradford
phone: 814-362-7557

C.1.2 Permission to use the Worry About Sexual Outcomes Scale

From: Jessica Sales [jmcderm@emory.edu]
Sent: Sunday, August 08, 2010 4:53 PM
To: Haley, Tammy Michelle
Subject: Re: scale
Attachments: Health Education Research article 2008.pdf

Hi Tammy,
Yes, please feel free to use the scale. I have attached the article which contains the items and the suggestions for scoring either using the subscales or as a total, combined scale. Hope this is helpful, and best of luck with your research!
Take care,
Jessica
PS - I don't think there is anything special you will need to do with this scale for use with rural populations.
--
Jessica McDermott Sales, PhD
Research Assistant Professor
Emory University
Rollins School of Public Health
Department of Behavioral Sciences and Health Education 1520 Clifton Rd., NE,
Room 266 Atlanta, GA 30322
phone: 404-727-6598
fax: 404-712-9738
email: jmcderm@emory.edu

Quoting "Haley, Tammy Michelle" <tmh24@pitt.edu>:

Dr. Sales,
Good Morning. My name is Tammy Haley and I am a doctoral student at the University of Pittsburgh. I am currently working toward a PhD in nursing and a concurrent Masters degree in Public Health. My research focus is directed toward reducing sexual risk-taking in rural adolescents. Although this group is not typically thought of as high-risk in the traditional sense, STI/HIV rates in some rural populations are rapidly increasing. In addition, rural dwellers often report increased rates of teen-pregnancy and are commonly affected by complications from common STIs including late stage cervical dysplasia due to issues of exposure and lack of access to healthcare services.

I am hoping to conduct a school based survey in adjacent school districts in rural PA to assess sexual risk-taking behavior and condom use attitudes and was interested in the possibility of using the Worry about Sexual Outcomes Scale. While my intended study population does not mirror the population used for validation, this study would support your suggestion or testing of the tool in more diverse populations in terms of gender.

Would you possibly be able to provide permission for use of the scale and information on obtaining the actual measure along with any information related to analytic concerns (i.e.: should items be summed by factor or should they be considered individually). If you have any additional information related to the instruments use in rural populations, I would be very interested in your findings. Any information you are able to provide would be greatly appreciated. Thank you for consideration of this request and I look forward to hearing from you, Tammy

C.1.3 Permission to use the Sexual Risk Behavior Beliefs and Self-Efficacy Scales

From: Karin Coyle [mailto:karinc@etr.org]
Sent: Tuesday, June 01, 2010 7:28 PM
To: Haley, Tammy Michelle
Subject: RE: Safer Choices Survey

Hi Tammy,

I've attached a copy of the tool. You are most welcome to use it (we just ask you to cite the 1999 study or the 2001 outcome study). We have not really updated this particular tool, although we have used parts of it as a base for subsequent surveys. I have not worked with rural youth, but agree they are an important population to study and for intervention. I've attached an older document on HIV and rural communities from CAPS that you may have seen. I don't have other referrals for this population at the moment, but if I think of colleagues I'll let you know.

Best of luck with your work,
Karin

Karin K. Coyle, PhD
Senior Research Scientist
ETR Associates
4 Carbonero Way
Scotts Valley, CA 95066
(831) 438-4060 (831) 438-4060

C.1.4 Permission to use the Intention to Use Condoms Scale

From: Richardson, Holly
To: Haley, Tammy Michelle
Subject: RE: query
Date: Thursday, May 03, 2012 8:48:41 AM

Hello Tammy,
I apologize for not getting back to you sooner. I've reviewed your request and I am giving permission for you to use the "Intentions to Use Condoms Scale" in the appendix of your dissertation and in future publications with the condition that the scale is appropriately attributed to me as the original author of the work, along with the citation of the article or masters thesis from which it was taken.
Please let me know if you need any further clarification.
PS: I would be interested in receiving a copy of your work if you are willing to share.
All the best in the completion of your dissertation.
Holly

Holly Richardson RN PhD(c)
Assistant Professor
School of Nursing
Dalhousie University

5869 University Avenue
PO BOX 15000
Halifax, NS B3H 4R2
Phone: (902) 473-8437

From: Haley, Tammy Michelle [tmh24@pitt.edu]
Sent: April 27, 2012 10:17 AM
To: Richardson, Holly
Subject: RE: query
Holly,
I do not know if you remember me. I was a student working on my PhD at the University of Pittsburgh and I had asked for permission to use your "Intentions to Use Condoms Scale" in my dissertation work. At that time I neglected to inquire specifically about the possibility of including the scale items in the Appendix of my dissertation work.

I am not certain if this is a copyrighted work or not. In seeking the initial permissions I had initially contacted the journal editor (Alex McKay, the Associate Editor for the Canadian Journal of Human Sexuality) and had been redirected to you for permissions which indicates to me that you may have retained the copyright if the scale is in fact copyrighted.

Therefore, I am writing at this time to ask your permission to reprint the scale items in the Appendix of my dissertation. The requested permission extends to any future revisions and editions of my dissertation, including non-exclusive world rights in all languages, to the electronic publication of my dissertation by the University of Pittsburgh, and to the prospective publication of my dissertation by ProQuest. ProQuest may supply copies of my dissertation on demand. These rights will in no way restrict republication of the material in any other form by you or by others authorized by you. Your approval of this request will also confirm that you own [or your company owns] the copyright to the above-described material. If these arrangements meet with your approval, please respond with a confirmatory statement indicating that I may include the scale items in the Appendix of my dissertation work. If the work is not copyrighted, or you do not own the copyright, I would greatly appreciate it if you would let me know that as well. Thank you very much for considering this request.

Sincerely,
Tammy M. Haley RN, PhD
Assistant Professor of Nursing
RN-BSN Program Coordinator
University of Pittsburgh at Bradford
phone: 814-362-7557

C.1.5   Permission to use the Parent-Adolescent Communication Scale

From: Jessica Sales [jmcderm@emory.edu]
Sent: Monday, August 16, 2010 10:39 AM
To: Haley, Tammy Michelle
Subject: RE: scale

Hello Tammy,
Of course, please feel free to use the Parent-Adolescent Communication scale as well. And please also feel free to contact me anytime if you questions regarding the scales.
Again, best of luck with your project!
Take care,
Jessica
--
Jessica McDermott Sales, PhD
Research Assistant Professor
Emory University
Rollins School of Public Health
Department of Behavioral Sciences and Health Education 1520 Clifton Rd., NE,
Room 266 Atlanta, GA 30322
phone: 404-727-6598
fax: 404-712-9738
email: jmcderm@emory.edu

Quoting "Haley, Tammy Michelle" <tmh24@pitt.edu>:

> Dr. Sales,
> I have just come across a final scale that I believe would be
> relevant for my proposed study...and it appears that you were a part
> of the scale construction/validation of that instrument as well. I
> believe this will provide the final measure for my project and fit
> nicely due to the strong properties and parsimony of the instrument.
>
> The scale I am referring to is the 5-question Parent-Adolescent
> Communication Scale. I do have the publication from Health Education
> & Behavior (2008) which provides details about the scale properties
> and appears to contain the scale items and scoring as well.
>
> Would you possibly be able to provide permissions to use this scale
> as well? I believe this should be my final inquiry. I very much
> appreciate your support of my earlier request and your apparent
> support of this project!
>
> Thank you for consideration of this request.
> Sincerely,
> Tammy

C.1.6 Permission to use the Multidimensional Scale of Perceived Social Support

From: Facebook [notification+zi1=hdfz@facebookmail.com]
Sent: Monday, August 16, 2010 8:10 AM
To: Haley, Tammy Michelle
Subject: Gregory Zimet sent you a message on Facebook…

facebook

Gregory sent you a message.

Gregory Zimet August 16, 2010 at 11:09am

Re: request for scale use to Dr. Zimet

Hi Tammy,

You are actually the 2nd person to contact me through Facebook. My work email is gzimet@iupui.edu. You are welcome to use the MSPSS in your research. I can send you some additional information if you'd like; just email me your email address.

Greg Zimet

To reply to this message, follow the link below:

http://www.facebook.com/n/?inbox%2Freadmessage.php&t=1166544459235&mid=2d327abG4c0533bdG12be380G0&n_m=tmh24%40pitt.edu

APPENDIX D

PARENTAL NOTIFICATION FORM

[Name of School] is taking part in a survey to evaluate the health behaviors of young people age 13-19. This research survey is being sponsored by the Bradford Area United Way and the University of Pittsburgh at Bradford. The survey will ask about the health behaviors of 9th through 12th grade students. Along with questions about health related knowledge and self-esteem the survey will ask about alcohol and other drug use as well as behaviors that cause sexually transmitted infections and pregnancy.

Students will be asked to fill out a survey [date of survey]. The survey will be administered during normal school hours and takes about 45 minutes for the students to complete. The results of this survey will be used to help create new health education programs for high school students.

Doing this paper and pencil survey will cause little or no risk to your child. The only potential risk is that some students might find certain questions to be sensitive. The survey has been designed to protect your child's privacy. Students will not put their names on the survey. Also, no school or student will ever be mentioned by name in a report of the results. Your child will get no benefit right away from taking part in the survey. However, the results of this survey may help your child and other children in the future.

We would like all students to take part in the survey, but the survey is voluntary. No action will be taken against the school, you, or your child if your child does not take part. Students can skip any questions they do not wish to answer. In addition, students may stop participating in the survey at any point without penalty. If you would like to see the survey before your child completes it, you are encouraged to call Tammy Haley at the University of Pittsburgh at Bradford (XXX) XXX-XXXX, to review the survey forms.

Please read the section below and check the box **only if you do not** want your child to take part in the survey. If you check the box "no" below, then sign this form and return it using the self-addressed envelope provided within 3 days. If you have more questions about the survey, please call Tammy Haley at the University of Pittsburgh at Bradford (XXX) XXX-XXXX. Thank you.

_____

Student's name: _____ Grade: _____

I have read this form and know what the survey is about.

[ ] NO, my child may not take part in this survey.

Parent's signature: _____ Date:_____

Phone number: _____

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APPENDIX E

ADDITIONAL RESULTS TABLES

E.1.1   Prevalence of high-risk behaviors among sexually active youth which may contribute to STI or teen pregnancy by grade and gender (N=613)

Alcohol use at least once in your lifetime

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	91.5	79.5-97.1	97.9	88.0-99.9	94.7	87.9-98.0
10	92.1	83.5-96.6	87.9	76.2-94.3	90.3	83.9-94.3
11	88.9	80.0-94.2	88.2	79.4-93.6	88.6	82.7-92.6
12	88.0	80.7-92.8	91.1	83.7-95.4	89.4	84.6-92.9
Total	89.7	85.8-92.6	90.8	86.4-93.6	90.2	87.5-92.3

Alcohol use in the last 30 days

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	46.8	33.3-60.7	58.3	44.2-71.1	52.6	42.6-62.3
10	50.0	39.0-60.9	65.5	52.6-76.4	56.7	48.2-64.8
11	49.4	38.7-60.0	56.5	45.8-66.5	53.0	45.4-60.4
12	43.6	34.9-52.6	58.4	48.6-67.5	50.5	43.8-57.0
Total	47.0	41.6-52.5	59.2	53.5-64.7	52.9	48.9-56.7

Marijuana use in the last 30 days

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	29.8	18.25-44.0	37.5	25.9-51.6	33.7	24.9-43.6
10	22.4	14.3-33.0	39.7	28.0-52.5	29.9	22.7-38.0
11	17.3	10.4-27.0	31.8	22.8-42.3	24.7	18.7-31.8
12	19.7	13.4-27.8	31.7	23.4-41.3	25.2	19.9-31.4
Total	21.2	17.0-25.9	34.2	29.0-39.8	27.4	24.0-31.0

Cocaine Use in the last 30 days

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	4.3	.03-15.4	6.2	1.5-17.4	5.3	1.9-12.0
10	9.2	4.2-18.8	5.2	1.2-14.7	7.5	3.9-13.3
11	1.2	0.0-7.3	10.6	5.4-19.2	6.0	3.1-10.8
12	0.0	0.0-6.4	3.0	0.0-8.7	1.4	0.2-4.1
Total	3.1	1.6-5.7	6.2	3.8-9.5	4.6	3.1-6.5

Inhalant use at least once in your lifetime

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	14.9	7.0-28.0	22.9	13.5-36.7	18.9	12.5-28.0
10	23.4	15.4-34.4	29.3	19.1-42.0	26.1	19.3-34.1
11	17.3	10.4-27.0	24.7	16.7-34.9	21.1	15.5-27.9
12	10.3	5.8-17.2	13.9	7.4-20.9	11.5	7.8-16.4
Total	15.9	12.8-20.3	21.2	16.9-26.3	18.4	15.5-21.7

Methamphetamine use at least once in your lifetime

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	4.3	.00-15.0	10.4	4.6-24.9	7.4	3.3-14.6
10	7.9	3.3-16.4	12.1	5.6-23.1	9.7	5.6-16.0
11	4.9	1.5-12.4	9.4	4.6-17.7	7.2	4.0-12.3
12	7.7	3.9-14.1	3.0	0.0-8.7	5.5	3.0-9.4
Total	6.5	4.2-9.8	7.9	5.2-11.5	7.2	5.3-9.5

Steroid Use at least once in your lifetime

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	4.3	0.3-15.0	10.4	4.8-20.1	7.4	3.8-14.6
10	2.6	0.1-9.6	3.4	0.2-12.4	3.0	0.9-7.6
11	2.5	0.1-9.0	11.8	6.3-20.5	7.2	4.0-12.3
12	1.7	0.0-6.4	3.0	0.6-8.7	2.3	0.8-5.4
Total	2.5	1.1-4.9	6.8	4.2-10.3	4.6	3.1-6.5

Prescription Drug Use at least once in your lifetime

	Female		Male		Total	
Grade	%	CI	%	CI	%	CI
9	27.7	16.8-41.8	31.2	19.8-45.4	29.5	22.4-39.3
10	23.7	15.4-34.4	39.7	27.0-52.5	30.6	23.4-38.8
11	32.1	22.9-42.9	32.9	23.8-43.5	32.5	25.8-39.9
12	34.2	26.2-43.1	33.7	24.2-42.3	33.5	27.5-40.0
Total	30.2	25.4-35.4	33.9	2.8-3.9	32.0	28.4-35.7

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