FACTORS ASSOCIATED WITH SEXUAL DEBUT AND DEPRESSION AMONG ADOLESCENTS IN RURAL JAMAICA

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PUBLIC HEALTH

ABSTRACT

Individual and family factors have been hypothesized to influence adolescent sexual behavior and depression, but the extent to which this is true for adolescents in Jamaica as a whole and for those in rural areas in particular, has not been well studied. The objective of this dissertation was to identify individual and family factors associated with sexual debut and depression among rural Jamaican adolescents.

To elucidate these factors and to provide information to guide future interventions, we analyzed data on 748 adolescents attending public high schools in the rural parish of Hanover, Jamaica. Multivariate logistic regression was used to predict factors associated with sexual experience, early sexual debut, and depression.

For girls sexual experience was associated with older age at time of survey [Odds ratio (OR) = 1.54; 95% confidence interval (CI) = 1.29-1.84], hanging out with boyfriends (OR=2.27; 95% CI = 1.37-3.76), and lack of parental monitoring (OR=1.20; 95% CI = 1.07-1.35). Living with both biological parents was protective (OR=0.45; 95% CI = 0.30-0.67). For boys being older at time of survey (OR=1.47; 95% CI = 1.07-2.02) and lack of parental monitoring (OR=1.19; 95% CI = 1.01-1.39) were significant predictors.

Early sexual debut for girls was influenced by type of partner at first intercourse (OR=11.95; 95% CI = 2.39-59.69) and liberal attitude towards negative sexual outcomes (OR=1.83; 95% CI = 1.21-2.77). Liberal attitude towards negative sexual outcomes
(OR=3.11; 95% CI = 1.09-8.93) was a major predictor for boys. Being older at time of
interview was protective for both genders. Elevated depressive symptom was associated
with perceived lack of maternal affection and support (OR=4.06; 95% CI = 2.61-6.32).

Our findings have implications for policy and practice. Education programs that
will delay initiation of sexual activity need to start early before adolescents become
sexually active. Considering gender differences in some of the factors associated with
sexual behavior, prevention programs must adequately address the social and cognitive
needs of both sexes. As most homes are female-headed, establishing support systems for
the mother to take care of their adolescent children may decrease the odds of depressive
symptoms.
DEDICATION

This dissertation is dedicated to the affectionate memory of my late grand mother Chief (Mrs) Abigail Alaka-Ekundayo, whose legacy of hard work and perseverance has continued to be my inspiration.
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MATERIALS AND METHODS
LITERATURE REVIEW

Introduction

Adolescence is the period of transition from childhood to adulthood, and according to the World Health Organization (WHO) covers the age of 10-19 (WHO, 1995), with remarkable proportions of young people engaging in their first sexual intercourse during this period. Initiation of sexual activity among adolescents has become a public health concern as a result of the continued decline in the age of sexual debut (Centers for Disease Control and Prevention (CDC), 1998) with its social and health consequences (Santelli, DiClemente, Miller, & Kirby, 1999; Coker, Richter, Valois, McKeown, Garrison, & Vincent, 1994). Early sexual debut places adolescents at high risk for unintended pregnancy (Coker et al., 1994) and sexually transmitted infections (STIs) (Upchurch, Mason, Kusunoki, & Kriechbaum, 2004), including Human Immunodeficiency Virus (HIV) (CDC, 2002). Early child bearing has been linked to higher rates of maternal and child morbidity and mortality (Salihu, Sharma, Ekundayo, Kristensen, Badewa, Kirby, & Alexander, 2006), limited life opportunities, and lower future family income (Botting, Rosato, & Wood, 1998).

Understanding the factors that influence an adolescent’s engagement in sexual activity has implications for policy and practice (Small & Luster, 1994). This is important because sexual intercourse is the most important determinant of pregnancy and STIs. As a result identifying factors related to sexual activity is central to addressing the issue of teenage pregnancy. In addition, the current HIV epidemic, along with the proliferation of other STIs makes early sexual intercourse a health hazard.
Depression refers to any downturn in mood characterized by feelings of sadness, despair and discouragement, as opposed to clinical depression which is marked by symptoms so severe that they interfere with daily living. Although under-recognized among adolescents (Saluja, Iachan, Scheidt, Overpeck, Sun, & Giedd, 2004) depression is a highly prevalent condition in this age group, and has become a major public health issue in the past two decades (Saluja et al., 2004; Patten, Gillin, Farkas, Gilpin, Berry, & Pierce, 1997; Kubik, Lytle, Birnbaum, Murray, & Perry, 2003). Sexually active adolescents have been reported to experience elevated depressive symptoms compare to their sexually abstinent peers (Rector, Johnson, & Noyes, 2003; Kaltiala-Heino, Kosunen, & Rimpela, 2003; Hallfors, Waller, Bauer, Ford, & Halpern, 2005; Tubman, Windle, & Windle, 1996). The stress associated with early involvement in sexual activity has been implicated in this relationship (Hallfors et al., 2005). Depressed adolescents are more likely than any other youth to engage in unsafe sexual practices and other risky behaviors (Brooks, Harris, Thrall, & Woods, 2002; Shrier, Harris, & Beardslee, 2002; Kosunen, Kaltiala-Heino, Rimpela, & Laippala, 2003). Previous research conducted in many western countries suggested that mental health problems including depression and low self esteem are more common in female than male adolescents (Saluja et al., 2004; Patten, Gillin, Farkas, Gilpin, Berry, & Pierce, 1997; Kubik et al., 2003; Puskar, Tusae-Mumford, Sereika, & Lamb, 1999; Schraedley, Gotlib, & Hayward, 1999; Brooks et al., 2002), and sexually experienced adolescents exhibit more depressive symptoms than their sexually abstinent peers (Tubman et al., 1996).

Several recent studies from western countries have profiled the characteristics of young people who had engaged in sexual intercourse (Sieverding, Adler, Witt, & Ellen,
factors associated with initiation of sexual activity during adolescence vary. Individual and family factors have been hypothesized to influence adolescent sexual behavior (Small & Luster, 1994), but the extent to which this is true for adolescents in Jamaica as a whole and for those in rural areas in particular, has not been well studied.

In this dissertation we present a systematic review of literature related to factors associated with sexual debut and the relationship between adolescent depression and sexual activity. Information for this review came from a comprehensive search of titles related to adolescent sexual debut and depression using PUBMED and other bibliographic databases conducted between May and August 2006, using key words such as “individual factors AND adolescent sexual debut”, “family factors AND adolescent sexual experience”, “sexual activity AND depression” and “sexual behavior AND Jamaican adolescents”. The abstracts of relevant articles and full articles available on line were accessed. Full texts were then obtained from hand search of journals held in stock by the Lister Hill Library of the Health Sciences at the University of Alabama at Birmingham. Further searches were conducted based on links from the articles cited and was limited to publications from 1975 to 2006. Relevant websites such as that of the WHO, United Nations Children Fund (UNICEF), CDC, International Planned Parenthood
Federation (IPPF), United States Agency for International Development (USAID), were also searched. Information was also obtained from websites related to relevant agencies in Jamaica, like the Ministry of Health, Ministry of Education, Youth and Culture, and the Statistical Institute of Jamaica.

Determinants of Adolescent Sexual Activity

A growing number of studies have reported on factors associated with the initiation of sexual activity during adolescence. Among the most important of these are individual and family factors, with extra-familial and broad socio-cultural factors determining the nature and contribution made by the individual and family factors, conforming to the social ecological model of behavior explicated by Bronfenbrenner (1979, 1989). Adolescent individual factors include biologic characteristics such as gender (Valle et al., 2005; Santelli et al., 2004), pubertal status (Meschke, & Silbereisen, 1997), and other developmental and psychosocial characteristics such as future aspirations (Valle et al., 2005), religiosity (Rostosky et al., 2003), academic self perception (Schvaneveldt et al., 2001), self efficacy (Santelli et al., 2004), self esteem (Robinson, Telljohann, & Price, 1999; Spencer et al., 2002; Paul et al., 2000), adolescent leisure activities (Meschke, & Silbereisen, 1997), drug and substance use (Mott, Fondell, Hu, & Kowaleski-Jones, 1996; Robinson et al., 1999; Santelli et al., 2004; Paul et al., 2000), and symptoms of depression (Kaltiala-Heino et al., 2003; Rector et al., 2003; Tubman et al., 1996).

Family influences on early onset of sexual activity include broad demographic categories such as race (Upchurch, Levy-Storms, Sucoff, & Aneshensel, 1998), parental
socio-economic status (Miller, 2002), education (Brewster, 1994), as well as aspects of family function, such as family structure defined by whether adolescents lived in same household with their biological parents or not (Young, Jensen, Olsen, & Cundick, 1991), family size (Widmer, 1997), and parental monitoring and supervision of adolescent activities (Sieverding et al., 2005). Factors at the extra-familial level include neighborhood quality (Browning, Leventhal, & Brooks-Gunn, 2004), peer group behaviors (Kinsman, Romer, Furstenberg, & Schwarz, 1998; Sieving et al., 2006), the school (McNeely & Falci, 2004), and religious institutions (Thornton & Camburn, 1989). Broad societal factors include cultural (Brewster, Billy, & Grady, 1993) and socio-economic (Blum, Beuhring, Shew, Bearinger, Sieving, & Resnick, 2000) factors, and the influence of the media (Collins, Elliot, Berry, Kanouse, Kunkel, Hunter, & Miu, 2004). The relationship between some of these variables and early heterosexual activity remains ambiguous, with studies reporting conflicting results (Udry & Billy, 1987; Rostosky et al., 2003; Robinson & Frank, 1994).

**Individual Factors**

Individual determinants of sexual initiation tend to draw on both biological and psychosocial components. Biological explanations suggest that the timing of puberty has a significant influence on initiation of sexual intercourse (Edgardh, 2000; Meschke & Silbereisen, 1997). Udry and Billy (1987), however, stated that this could be true for boys, but there appears to be a more complex relationship for girls, with social control playing a more important role than pubertal timing. In a longitudinal study by Spencer et al (2002) pubertal status was unrelated to initiation of coitus.
Adolescents with high educational goals and achievement delay initiation of sexual intercourse (Schvaneveldt et al., 2001; Valle et al., 2005; Santelli et al., 2004; Paul et al., 2000). Schvaneveldt et al (2001) suggested that this might be because of the perceived potential costs of sexual intercourse; which might jeopardize adolescents’ plans for the future. Early coital debut has been attributed to low expectations for academic achievement and poor academic performance in school (Costa, Jessor, Donovan, & Fortenberry, 1995).

Engaging in early sexual intercourse has been associated with problem behavior (Capaldi, Crosby, & Stoolmiller, 1996). Consistent with this view, a relationship has been established between early sexual activity and alcohol consumption, smoking behavior, delinquency, and use of illicit drugs (Capaldi et al., 1996; Mott et al., 1996; Santelli et al., 2004; Paul et al., 2000). Adolescent choice of leisure context has been viewed as a significant means of promoting friendship development. Meschke and Silbereisen (1997) reported that both risky and social/romantic leisure context are significant predictors of early sexual debut.

Some authors have suggested that religious involvement measured by church attendance directly promotes the delay of sexual intercourse (Paul et al., 2000; Rostosky et al., 2003; Mott et al., 1996). When examined by gender, race, and social class, however, findings indicate that the association is less straightforward (Rostosky et al., 2003). White adolescent girls, who score high on religiosity, have been reported to delay coital debut relative to their non-religious peers (Rostosky et al., 2003). The association for boys in general and for African American boys and girls, are however inconsistent (Rostosky et al., 2003). For instance, in a sample of low socio-economic status
adolescents from the National longitudinal survey of Youth, white and African American adolescents of both genders who participated in religious activities and had friends who attended church were more likely to delay coital debut (Mott et al., 1996). In another study, Bearman and Bruckner (2001) reported that religiosity delayed coital debut for White, Asian, and Hispanic middle and late adolescents, but had no effect on Black adolescents.

Self-esteem defined as feelings of self-worth and self pride stemming from an individual's positive or negative beliefs about being valuable and capable has been associated with initiation of sexual intercourse. Studies however, have produced conflicting results (Robinson et al., 1999; Spencer et al., 2002; Orr, Wilbrandt, Brack, Rauch, & Ingersoll, 1989; Robinson & Frank, 1994). A cross-sectional study of self-esteem using adolescents age 12 to 16 found that self esteem scores for non-virginal girls were significantly lower than those of virginal girls, with no relationship between self esteem scores and coital status for boys (Orr et al., 1989). In another cross-sectional study by Robinson and Frank (1994), no relationship was found between gender, self esteem, and coital status. A longitudinal study of self esteem and transition to non-virginity found no significant correlation between pre-existing self esteem and initiation of coitus for girls (Jessor & Jessor, 1975). However, higher levels of preexisting self esteem were predictive of transition to coitus for boys (Jessor & Jessor, 1975). Spencer et al., (2002) in a longitudinal study, reported that girls with higher self esteem were more likely to remain virgins, than girls with lower self esteem.

Earlier research on adolescent sexual activity in the United States was focused mainly on females given the long-existing interest in the prevention of teenage pregnancy.
(Santelli et al., 2004). However studies that have included both males and females have shown conflicting results in gender differences in the age at first sexual experience. Some studies indicated that boys initiate sex earlier than girls (Valle et al., 2005; Santelli et al., 2004); others do not (Rosenthal, Smith, & de Visser, 1999; Paul et al., 2000).

Explanations for the observed younger ages at first sex for males have centered on biological and maturational differences, variations in social controls, such as parental supervision, and differences in the opportunity cost of becoming sexually active (Rosenthal et al., 1999).

*Family Factors*

Family influences on early onset of sexual activity include broad demographic categories such as race, class, education, family socio-economic status, family structure (living with biological parents or not), and family context variables determined by parent-adolescent relationship such as parental monitoring and supervision of adolescent activities and parent-child communication. Some authors have reported that black adolescents initiate sex early compared to their white counterparts (Upchurch et al., 1998; Santelli et al., 2004); others did not find any difference (Felton & Bartoces, 2002). Socio-economic conditions (household income and mother’s education) have been shown to account for ethnic differences in rates of first intercourse (Upchurch et al., 1998; Miller, Norton, Curtis, Hill, Schvaneveldt, & Young, 1997). Upchurch and co-researchers (1998) after controlling for socio-economic conditions reported similar median ages at first sexual intercourse for black and white girls.
Conflicting reports of the association between socio-economic status of parents and early coital debut in their adolescent children has been reported in some studies. Findings suggest a positive association between parental education and occupational status and age of coital debut (Miller et al., 1997), for boys in some studies (Ku, Sonenstein, & Pleck, 1993), and only for girls in other studies (Bearman & Bruckner, 2001). Brewster (1994) reported that adolescent females whose mothers attended college were more likely to delay coital debut. Yet in another sample of 926 high school students, parental education was not associated with the virginity status of boys or girls (Feldman, Holowaty, Harvey, Rannie, Shortt, & Jamal, 1997).

Growing up in single-parent-, step-, or cohabiting families has been reported to have negative effects on adolescents’ sexual behavior (Velez-Pastrana et al, 2005, Santelli, Lowry, Brener, & Robin, 2000). Some authors did not replicate these findings in their studies (Hovell, Sipan, Blumberg, Atkins, Hofstetter, & Kreitner, 1994). Davis and Friel (2001) reported that with the exception of girls in single parent families, family structure does not significantly influence adolescents’ sexual initiation. They postulated that the family context, more specifically the mother-child relationship, their level of interaction, and the mother’s attitudes towards and discussion of sex is associated with adolescents’ sexual debut (Davis & Friel, 2001). The effect of family structure also appears to depend on age. Forste and Heaton (1988), in their study concluded that adolescents who lived with both parents at age 14 were less likely to have initiated first intercourse by age 15; however, after age 16, family structure had less effect. Earlier studies have produced inconsistent results regarding the relationship between parental monitoring and sexual experience. While some studies reported parental monitoring as
being protective (Sieverding et al., 2005), others implicated overly strict parenting and intrusive psychological control as being associated with early sexual debut (Upchurch et al., 1998).

Other Factors

Other intervening factors at the extra-familial and broad societal level have been reportedly associated with early sexual intercourse. Findings across studies of young teenagers from diverse ethnic backgrounds indicated that young sexually experienced adolescents are more likely than their sexually inexperienced counterparts to report that their friends are also sexually experienced (Kinsman et al., 1998; Rosenthal et al., 2001). Small and Luster (1994), however reported that peer conformity was not related to sexual activity. Other factors reported to be associated with sexual activity include lack of positive experiences in school such as perceived lack of teacher support, safety, and social belonging (McNeely & Falci, 2004; Paul et al., 2000), living in a community perceived as low quality as characterized by neighborhood socio-economic status (Browning et al., 2004), and negative influences from the media such as sexually explicit television shows (Collins et al., 2004).

Adolescent Depression and Sexual Behavior

Studies have shown that engaging in sex places adolescents, especially girls at risk for depression (Rector et al., 2003; Kaltiala-Heino et al., 2003; Hallfors, et al., 2005; Tubman et al., 1996). Adolescent girls engaging in sexual activity has been reported to experience depressive symptoms more than boys with similar behavior (Waller, Hallfors,
Halpern, Iritani, Ford, & Guo, 2006). Earlier, Tubman et al (1996) reported that sexually experienced adolescents displayed more depressive symptoms than their sexually abstinent peers. In their analysis of the National Longitudinal Survey of Adolescent Health, Rector et al (2003) reported that sexually active girls were more than three times more likely to be depressed than girls who were not sexually active. In the same study, boys who were sexually active were twice as likely to be depressed compared to those who were not sexually active (Rector et al., 2003).

Depressed adolescents may be engaging in sexual activity as a form of “self-medication” (Kaltiala-Heino et al., 2003). This assertion however, was not supported by the longitudinal study conducted by Hallfors et al (2005). They reported the stress associated with sexual activity plays a causal role in the development of adolescent depressive disorders rather than sexual activity being a reaction to depression. Furthermore depressed adolescents are more likely than any other youth to engage in unsafe sexual practices and other risky behaviors (Waller et al., 2006; Shrier et al., 2002; Brooks et al., 2002; Hallfors, et al., 2005). Symptoms of depression may occur more often during adolescence than at any other life stage (Saluja et al., 2004; Patten, et al., 1997; Kubik, et al., 2003). In addition, lack of perceived parental social support has been found to be highly related to depressive symptoms (Patten et al., 1997).

Adolescent Sexual Activity in Jamaica

There is dearth of literature on factors associated with sexual debut during adolescence in Jamaica. Adolescent sexual activity and pregnancy however, has been associated with poverty, low educational levels, the absence of male role models in the
home, and a social milieu of conservative sexual ideals coexisting with tacit approval of early child bearing (Barnet, Eggleston, Jackson, & Hardee, 1996; McNeil, Olfason, Powell, & Jackson, 1983). Most information has been derived largely from qualitative research and anecdotal evidence (Jackson, Leitch, Lee, Eggleston & Hardee, 1998; Kempadoo & Dunn, 2001; Smith, Roofe, Ehiri, Campbell-Forrester, Jolly, & Jolly, 2003). Available empirical studies that examined the correlates of sexual debut were either retrospective or restricted to early adolescence. In a study that examined the correlates of early sexual intercourse among Jamaican women aged 15-50 years, family structure in childhood, early age at menarche, lower socio-economic status, and involvement in casual relationship were reported to be associated with initiation of sexual activity before the age of 16 years (Wyatt, Durvasula, Guthrie, LeFranc, & Forge, 1999). A major limitation of this study is the reliance on retrospective account of sexual initiation with possibility of recall bias. In another study, conducted among 7th grade adolescents attending new secondary and all-age schools, sexual experience was not associated with the type of residential giver, but with gender and alcohol use. The study however, was restricted to adolescents below the age of 15 (Jackson et al., 1998).

Jamaica, the third largest of the Caribbean Islands, has a population of approximately 2.6 million inhabitants (Statistical Institute of Jamaica, 2002). About one-third (29%) of the population consist of young people between the ages of 10 and 24 years (Statistical institute of Jamaica, 2002). Available data indicates that Jamaican adolescents initiate sexual activity early (Eggleston, Jackson, & Hardee, 1999; Adolescent Condom Survey, 2001), and engage in risky sexual behavior (McFarlane, Friedman, Goldberg & Morris, 1999; Adolescent Condom Survey, 2001). In the 2001
Adolescent Condom Survey, 63% of females and 83% of males 10-19 years old reported having had sexual intercourse. In another study, mean age at first sexual intercourse for boys and girls was reported to be 9.4 and 11.3 years respectively (Eggleston et al., 1999). In the Adolescent Condom Survey, only 42% of respondent 15-19 years old and 26% of 10-14 years old used contraceptives the first time they had sexual intercourse (Adolescent Condom Survey, 2001).

The pregnancy rate among Jamaican adolescents (79 live births per 1,000) although declining compared to 112 per thousand in 1997 still represents one of the highest in the Caribbean (USAID, 2005). Adolescent pregnancy in the country represents a social and public health problem (Jackson et al., 1998). Before they reach the age of 20, 40% of Jamaican women have been pregnant at least once (McFarlene et al., 1999), and over 80% of these adolescent births are mistimed or unwanted (McFarlene et al., 1999). Among ever-pregnant adolescent females in Jamaica, almost one-third became pregnant while still in school, and only 16% of these returned to school after the birth of their child (McFarlene et al., 1999; IPPF, 1999). Most adolescent pregnancies are often unintended, and consequently pregnant adolescents often seek illegal abortions from untrained and unqualified personnel, conducting abortions under unsafe conditions. The resulting infections and complications are an important cause of maternal morbidity and mortality in the country (IPPF, 1999).

In addition to their susceptibility to unintended pregnancy, early initiation of sexual intercourse and unprotected sex predisposes adolescents to STIs including HIV. In 2004, HIV was the second leading cause of death for both young men and women in Jamaica (age group 15-24 years old) (National HIV/STI Prevention and Control Program,
2006). The prevalence of other STIs is also high and ranked fourth among the major causes of health center visits for males and third for females (Ministry of Health Annual Report, 1999)

Available statistics from rural areas showed that adolescents are engaging in risky sexual activity. For instance in Hanover, a rural parish of about 67,000 people (Jamaica Sustainable Development Network, 2004), approximately 25% of births in this parish in 1997 were attributed to teen mothers (Hanover Health Department, Annual Report, 1997). The parish also has the third highest rate (217.1 per 100,000 population) of HIV infection in the country (Ministry of Health Annual Report, 2001). Prior to this study, no empirical research has been conducted to identify the determinants of engagement in sexual activity among rural adolescents in Jamaica.

Discussion and Conclusions

Early adolescent sexual debut is a serious public health concern world-wide. It is associated with other behaviors that increase risk for pregnancy and STIs, including more frequent intercourse, greater numbers of sexual partners, and lower probability of contraceptive use during the adolescent years. Adolescents who initiate sexual intercourse early are at high risk for unintended pregnancies (Coker et al., 1994). They are also prone to the contraction of STIs (Upchurch et al., 2004), including HIV (CDC, 2002). Most studies aimed at identifying factors associated with early initiation of sexual activity among adolescents have been conducted among urban high school students in industrialized countries of North America and Europe. Most of these studies however, have produced ambiguous and inconsistent results. From these studies, it appears that
sexual activity during adolescent years is determined mostly by individual and family characteristics, with intervening influences provided by extra-familial and broad societal factors.

Empirical studies aimed at identifying factors associated with adolescent sexual activity in Caribbean countries like Jamaica is scarce, and none has specifically focused on young people in rural areas. Generalizations about rural Jamaican adolescents based on research conducted in developed countries or in urban cities in developing countries may be misleading. The nature and contribution made by the different individual and family factors may actually vary according to culture and level of economic development within a country and region.
The objective of this study was to identify factors associated with sexual debut and depression among high school adolescents in the parish of Hanover, Jamaica. Most information on factors associated with adolescent sexual activity in the country has been derived largely from qualitative research and anecdotal evidence. In this thesis, we seek to identify individual and family factors associated with initiation of sexual activity among rural Jamaican adolescents. We also want to ascertain whether there is any relationship between self-reported depressive symptoms and sexual experience. It is important to identify predictors of sexual activity in this environment because of the high rates of adolescent pregnancy and STIs and to aid in the designing of appropriate intervention strategy.

The specific aims and hypotheses in this thesis are:

1. To determine the effect of family structure and context on adolescent sexual activity in rural Hanover, Jamaica. We hypothesized based on literature (Velez-Pastrana et al., 2005) and available data that adolescents who lived in the same household with their biological parents will report being sexually abstinent compared to those who live in other settings.

2. To identify factors associated with initiation of sexual activity before the age of 16 years among rural Jamaican adolescents. We hypothesized based on literature (Santelli et al., 2004) and available data that male adolescents will initiate sexual activity early compared to their female counterparts.
3. To identify individual and family factors associated with self reported elevated depressive symptoms among adolescents in Hanover, Jamaica. We hypothesized based on literature (Kaltiala-Heino et al., 2003) and available data that sexually experienced adolescents will report elevated depressive symptoms compared to their sexually abstinent peers.
MATERIALS AND METHODS

The data for this study was obtained from the “Hanover Teen Study” collected in the summer of 1998 (Stallworth, Roofe, Clark, Ehiri, Mukherjee, Person, & Jolly, 2004). It was a cross-sectional study, designed to identify factors associated with sexual activity among adolescents residing in the rural parish of Hanover, Jamaica.

Conceptual Framework

Factors associated with initiation of sexual activity could be attributed to individual, family, and immediate social environmental factors, influenced by other broad environmental factors including cultural and socio-economic factors. Individual level factors include biological factors such as pubertal status, socio-demographic factors such as age and gender, drug and alcohol use, early and steady dating, and psychosocial factors such as self esteem, self-efficacy, religiosity, leisure activities, school performance, and future educational plans.

Family level factors such as lowered parental monitoring and presence, single parenting, parental divorce or separation during early adolescence, poor-parent child relationship, and low educational level of parents, parental attitude towards premarital sex, sexually active peers and siblings also contribute to adolescent sexual behavior. Extra-familial factors include school factors such as perceived lack of teacher support, safety, and social belonging. Others include peer influence, religious affiliation, and living in impoverished areas or in neighborhoods with high levels of violence. Broader societal factors include poverty, socio-cultural issues, and the media.
Engagement in sexual activity has been linked with depression (Hallfors, et al., 2005), while both depression and early sexual debut has been linked with unsafe sexual practices and other risky behavior (Shrier et al., 2002). Lack of parental support has also been associated with adolescent depression (Patten et al., 1997). Our framework for understanding the correlates of sexual debut and the relationship between adolescent sexual activity and depression is presented in Figure 1.

**FIGURE 1** Conceptual framework
Theoretical Framework

This study organized and synthesized risk factors that have been associated with adolescent sexual activity using the social ecological systems model as explicated by Bronfenbrenner (1979, 1989). Integrating a risk factor model into an ecological framework suggests that there are not only multiple risk factors connected with adolescent sexual activity, but that these risk factors exist at multiple levels of the adolescent’s life or social ecology (Small & Luster, 1994).

In the model, the developing individual is viewed as being nested within a set of interconnected systems. The multi-systemic levels include individual factors, such as the roles and characteristics of the developing individual. Risk factors at the individual level include socio-demographic and psychosocial factors. Family risk factors include living in single parent households, poor parental monitoring and having parents who are of low socio-economic status or who have little education. Extra-familial and immediate social environment factors include the school, religious institutions, peer factors, and neighborhood influence. At the outermost level are broad societal factors, such as socioeconomic status, media, and culture.

These factors interact in complex ways to influence adolescents’ involvement in sexual activity. An ecological, risk-focused approach also suggests that risk factors for males and females may be different given their genetic constitutions and typically different life experiences. This thesis seeks to assess factors associated with sexual debut and depression among rural Jamaican high school students both at the individual, family, and extra-familial level. The Bronfenbrenner’s ecological framework was used as guide to develop the questionnaire used for data collection.
Data Collection and Study Design

“Hanover Teen Study” was a cross sectional survey designed to identify factors associated with adolescent sexual activity in a rural setting in Jamaica, using a multi-stage cluster sampling method. The population of most parishes in Jamaica is predominantly rural, varying from 71.2 percent rural in Clarendon to 91.3 percent in Hanover (Jamaica Sustainable Development Network, 2004). Nine of the fourteen parishes are over 70 percent rural (see Appendix B). Hanover, the most rural parish was chosen for the study. Schools in this parish were grouped into two categories: (1) comprehensive (formerly new secondary schools) and (2) secondary high/technical high/agricultural high schools, based on methods of student admission into these schools. Students who perform well in the National Assessment Examination taken at the final
class in elementary school attend academically rigorous secondary high school and technical high schools which prepare them for college. On the other hand, admission to new secondary (now comprehensive high schools) providing a mixture of academic and vocational training is gained from feeder schools and those who did not perform well on the National Assessment Examination with little chance of continuing their education beyond the secondary level (see Appendix C).

788 students who were not selected at random participated in the study. The data generated from this study was analyzed for missing responses using the Statistical Package for the Social Sciences (SPSS) frequency procedure. Out of the original 788 participants, we excluded 40 (5.1%) with incomplete data on the outcome and key predictor variables from the analysis. For the 748 individuals remaining for analysis, missing data appeared to be randomly distributed across gender and coital status groups. In order to enhance statistical power, we replaced missing values for continuous variables by substituting the mean response given by respondents of the same gender. The range of missingness for continuous explanatory variables was between 0.7% and 3.3%. The largest (3.3%) is attributed to one of the measures of paternal affection and support “I feel loved by my father” (see Appendix D). The procedure used for data collection and quality control has been described previously (Stallworth et al., 2004). The Institutional Review Board (IRB) at the University of Alabama at Birmingham (UAB), and the Ethics Committee, Ministry of Health, Jamaica approved the protocol for the study.
Instrument and Measures

The survey instrument was developed based on a comprehensive literature review of factors associated with adolescent sexual activity and was guided by the Bronfenbrenner’s Social Ecological Model (Bronfenbrenner, 1979). The self-report questionnaire included questions on individual and family context variables.

Socio-demographics

Socio-demographic data was collected on variables such as current age, gender, type of school attended, family structure, and adolescent leisure (after school) activities. Type of school attended in this study is defined as comprehensive versus other high schools (technical and agricultural). Questions on leisure activities such as going straight home after school, hanging out with classmates, hanging out with girlfriend/boyfriend were answered “yes or no”.

Sexual experience is determined by the response of adolescents to the question “Have you ever had sex?” (Yes/No). This question was followed by: If yes, how old were you the first time you had sex (age in years)? We defined sex as a penis entering the vagina. Adolescents who reported sexual intercourse before the age of 16, the age of legal consent in Jamaica (Ward, 2001) were referred to as early starters, those who reported sexual intercourse at age 16 and above were referred to as late starters.

Family Context Variables

Family structure was measured by whether the adolescent lived in an intact two-parent family or not. We defined “intact family” as married biological parents living in
the same household with the adolescent. Adolescents were asked to answer “yes or no” if their parents discuss sexual issues with them.

Parental monitoring and supervision of adolescent activities was measured on three items to determine the extent to which parents know their child’s whereabouts, how much interest they show in who they spend time with, and what they do during their free time. A sample item is “My parents know where I go after school and weekends”. Response options range from 1 (all the time) to 5 (none of the time). A composite variable based on the sum of these three items was constructed to determine the level of monitoring of adolescents’ activities by the parents. A high score on these scales is considered as lack of parental monitoring /supervision.

Perception of parental affection and support was a four-item measure (each for the mother and the father). A sample item is: “I feel loved by my mother/father.” Response options to these questions range from 1 (all the time) to 4 (none of the time). Adolescents who were not living with their biological parents were asked to substitute “primary female or male guardian” for “mother/father”. Scores were combined separately for each parent to evaluate the level of affection between the adolescent and each of their biological or surrogate parents. High scores indicate lack of maternal/paternal affection and support.

**Psychosocial Measures**

Adolescents’ norms towards abstaining from sex were assessed with five items. A sample question is “Do you think teenagers should wait until they are older than 18 years to start having sex?” Response options range from 1 (yes) to 3 (no). A composite variable
based on the sum of scores on these items was constructed to determine adolescent’s attitude towards premature sex. High scores indicate permissive sex norms.

Norms about negative sexual outcomes was a two-item scale that assessed adolescents’ attitude towards teenage pregnancy (e.g., “Do you think you would feel really badly if you get pregnant or if you get someone pregnant as a school boy”). Response options range from 1 (yes) to 3 (no). A combined variable based on the sum of scores on these two items is constructed to determine adolescents’ feelings towards negative sexual outcomes. A high score is interpreted as liberal attitude towards negative sexual outcomes and indicates adolescents lack of worries about getting pregnant or getting somebody pregnant. Norms about refraining from sex and norms about negative sexual outcomes scales is based on the Alabama Rural Youth Survey instrument with reported reliability of 0.69 to 0.78 (Nagy, Watts, & Nagy, 2003).

We used a short form of the Beck’s Depression inventory II (BDI II) to measure depressive symptoms (Beck, Brown, & Steer, 1996). The depressive symptom measure consists of three items (sadness, tiredness, and suicidal thoughts). BDI II measures the severity of self-reported depression in adolescents and adults. The three symptoms were selected based on their high loadings on factor analysis (Beck et al., 1996) and ease of response by adolescents. Respondents were asked to describe themselves in relation to these symptoms in the past two weeks including the day of the interview. Each symptom is rated on a 4-point scale ranging from 0-3. Adolescents who scored at the upper quartile and above were referred to as having depressive symptoms to distinguish from normal mood changes during adolescence.
Aim 1: Individual and Family Factors Associated With Initiation of Sexual Activity Among Rural Jamaican Adolescents

The first aim of this study was to identify socio-demographic and family characteristics associated with being sexually experienced. Being sexually experienced was the outcome variable and it was determined by the response of adolescents to the question: “Have you ever had sex?” (Yes/No).

The data generated was analyzed for missing responses using the SPSS frequency procedure. Out of the original 788 participants, we excluded 40 (5.1%) with incomplete data on the outcome and key predictor variables from the analysis. For the 748 individuals remaining for analysis, missing data appeared to be randomly distributed across gender groups. In order to enhance statistical power, we replaced missing values for continuous variables by substituting the mean response given by respondents of the same gender. Overall the range of missingness for continuous explanatory variables for this specific aim was between 1.2% and 2.1%. The largest (2.1%) is attributed to age at time of survey (see Appendix D). We determined the internal consistency of the scale measures using Cronbach’s alpha statistic computed for the original sample of 788 participants (Cronbach, 1951).

We compared the following socio-demographic and family context variables with the outcome variable: gender, age at time of survey, activities engaged in after school, the type of school attended, family context measures such as family structure, parental monitoring, and discussion of sexual issues with parents. We then proceeded to perform logistic regressions between the outcome variable and each of the explanatory variables (bivariate) and between the outcome variable with all explanatory variables in the model (multivariate) to estimate crude and adjusted odds ratio (OR) with 95% confidence
intervals (CI). In the final model, insignificant variables were eliminated using stepwise and backward strategy with 10% cut-off. Statistically significant variables in the final model were fitted for each gender, to assess effect modification. The Nagelkerke’s ($R^2$) co-efficient of determination, defined as the proportion of variance explained by the regression model, and a measure of success of predicting the dependent variable from the independent variables was used in this study to assess the strength of the association predicted by the final model (Nagelkerke, 1991)

Aim 2: Determinants of Sexual Activity Before Age 16 Years Among Rural Jamaican Adolescents

The second aim of this dissertation was to determine factors associated with initiation of sexual activity before the age of 16 years. We obtained this information from the response of adolescents to the question “Have you ever had sex?” (Yes/No). This question was followed by: If yes, how old were you the first time you had sex (age in years)? Adolescents who had engaged in sexual intercourse were grouped into two categories based on age at first intercourse. Those who initiated sexual intercourse before age 16 were referred to as early starters and those who reported sexual intercourse at age 16 and above were late starters.

We determined the internal consistency of the scale measures using Cronbach’s alpha statistic computed for the original sample of 788 participants (Cronbach, 1951). We compared the following individual and family context variables with early sexual debut: gender, age at time of survey, activities engaged in after school, the type of school attended; family context measures such as family structure, parental monitoring, parental affection and support; and psychosocial measures such as permissive sex norms, liberal
Attitude towards negative sexual outcomes and depressive symptom score. Bivariate and multivariate logistic regressions were performed to estimate crude and adjusted odds ratio (OR) with 95% confidence intervals (CI). Stepwise and backward elimination strategy using a 10% cut-off was used to identify the final model that best predict early sexual debut. Statistically significant variables in the final model were fitted for each gender, to assess effect modification. The Nagelkerke ($R^2$) co-efficient of determination was used to measure the strength of the association predicted by the final model, as described earlier for aim 1.

**Aim 3: Correlates of Depressive Symptoms Among High School Students in Hanover, Jamaica.**

Our third aim was to identify socio-demographic and family factors associated with self-reported elevated depressive symptoms among adolescents in Hanover, Jamaica. We obtained information on depressive symptoms based on scores on the depressive symptom scale. The depressive symptom measure consists of three items (sadness, tiredness, and suicidal thoughts). BDI II measures the severity of self-reported depression in adolescents and adults. The three symptoms were selected based on their high loadings on factor analysis (Beck, Brown, & Steer, 1996) and ease of response by adolescents. Respondents were asked to describe themselves in relation to these symptoms in the past two weeks including the day of the interview.

Each symptom was rated on a 4-point scale ranging from 0-3. The maximum score was 9. We defined as having depressive symptoms those who score in the upper quartile of the distribution of the scores (Gadin, & Hammarstrom, 2005). Depressive symptom was dichotomized at this quartile (Scores at the upper quartile = Yes, others =
No). This was done to distinguish depressive symptoms from normal mood swings during adolescence. It is possible that adolescents with depressive symptoms may perhaps meet clinical diagnostic criteria for major depression; this study however, did not link self-reported depressive symptoms with formal diagnosis of clinical depression (Patten, et al., 1997).

The data generated was analyzed for missing responses using the SPSS frequency procedure. Out of the original 788 participants, we excluded 40 (5.1%) with incomplete data on the outcome and key predictor variables from the analysis. For the 748 individuals remaining for analysis, missing data appeared to be randomly distributed across gender groups. In order to enhance statistical power, we replaced missing values for continuous variables by substituting the mean response given by respondents of the same gender. The range of missingness for continuous explanatory variables for this specific aim was between 0.7% and 3.3%. The largest (3.3%) is attributed to one of the measures of paternal affection and support “I feel loved by my father” (see Appendix D). We determined the internal consistency of the scale measures using Cronbach’s alpha statistic computed for the original sample of 788 participants (Cronbach, 1951).

We compared the following socio-demographic and family context variables with depressive symptoms: gender, age, and sexual experience, family context measures such as family structure, parental monitoring, parental affection and support. Bivariate and multivariate logistic regressions were performed to estimate crude and adjusted odds ratio (OR) with 95% confidence intervals (CI). Stepwise and backward elimination strategy using 10% cut-off was used to identify the final model that best predict depressive
symptoms. The Nagelkerke ($R^2$) co-efficient of determination was used to measure the strength of the association predicted by the final model as described earlier for Aim 1.

All tests of hypothesis were two-tailed, and a p-value of 0.05 or less was considered as statistically significant. Statistical analysis was conducted using Statistical Package for the Social Sciences version 14 (SPSS Inc., Chicago, Illinois). Approval by the Institutional Review Board for Human Use at the University of Alabama at Birmingham was obtained prior to conducting this study (see Appendix E).
INITIATION OF SEXUAL ACTIVITY AMONG ADOLESCENTS IN RURAL JAMAICA: THE INFLUENCE OF FAMILY FACTORS

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OBJECTIVE: The objective of this study was to identify individual and family level factors associated with initiation of sexual activity among adolescents in the rural parish of Hanover, Jamaica.

METHODS: We analyzed data for a sample of 748 students attending public high schools in Hanover, Jamaica who completed a survey containing questions on age, gender, leisure activities, type of school attended, family structure, communication with parents on sexual matters, and parental monitoring of adolescent activities. Multivariate logistic regression was used to determine the association of these variables with sexual experience.

RESULTS: 62.7% of participants were sexually experienced. Gender differences were observed in the predictors of sexual debut. For girls sexual experience was associated with older age at time of survey [Odds ratio (OR) = 1.54; 95% confidence interval (CI) = 1.29-1.84], hanging out with boyfriends (OR=2.27; 95% CI = 1.29-1.84), and lack of parental monitoring (OR=1.20; 95% CI = 1.07-1.35). Living with both biological parents was protective (OR=0.45; 95% CI = 0.30-0.67). For boys being older at time of survey (OR=1.47; 95% CI = 1.07-2.02) and lack of parental monitoring (OR=1.19; 95% CI = 1.01-1.39) were significant predictors of past sexual activity.

CONCLUSION: Intervention programs must recognize gender differences in the predictors of sexual experience and implement a broad-range prevention strategy that can adequately address the social and cognitive needs of both sexes.

KEYWORDS: Sexual experience; adolescence; gender difference; rural Jamaica
Introduction

Worldwide, initiation of sexual activity among adolescents has become a public health concern as a result of the continued decline in the age of sexual debut (Centers for Disease Control and Prevention (CDC), 1998) and its attendant risks (Santelli, DiClemente, Miller, & Kirby, 1999; Coker, Richter, Valois, McKeown, Garrison, & Vincent, 1994). Research findings in the United States revealed that almost one half of teenagers have had sexual intercourse and they do so at an earlier age than previous generations (CDC, 1998; Santelli, DiClemente, Miller, & Kirby, 1999; Coker, Richter, Valois, McKeown, Garrison, & Vincent, 1994).

Engagement in sexual activity is the most important determinant of pregnancy and acquisition of sexually transmitted infections including Human Immune Deficiency Virus (HIV). This makes understanding factors that predispose adolescents to early sexual intercourse crucial in mounting programs to delay sexual intercourse. Several studies from developed countries have reported the characteristics of teenagers who had engaged in sexual intercourse (Hansen, Mann, McMahon, & Wong, 2004; Small, & Luster, 1994; Meschke, & Silbereisen, 1997). Factors at the individual level and the environment adolescents live or interact with, such as the family, peer group, school, and the neighborhood, have been suggested as key determinants of adolescent behavior including sexual initiation (Bronfenbrenner, 1989). The importance of these factors however, varies with the setting and the population studied.

Culture, level of economic development, and other social factors in a country may actually determine the nature and contribution made by the different individual and social factors. As a result generalizations about adolescents’ sexual activity in a developing
country, based on research conducted in industrialized countries like the United States may be misleading. In Jamaica for instance, adolescent sexual activity and pregnancy has been associated with poverty, low educational levels, the absence of male role models in the home, and a social milieu where premarital sexual relations and childbearing are both culturally reinforced and penalized (Barnet, Eggleston, Jackson, & Hardee, 1996; McNeil, Olfason, Powell, & Jackson, 1983). Typical Jamaican families are female-headed. High rates of migration, which occur partially in response to declining social and economic prospects, have contributed to the weakening of the family and community support structures. Many parents leave the island in order to seek employment overseas leaving children with inadequate guidance and protection (United Nations Children Fund (UNICEF), 2002). The impact of this family dispersal on adolescent sexual activity however, has not been supported with empirical evidence (Jackson, Leitch, Lee, Eggleston, & Hardee, 1998).

The Jamaican educational system has also been suggested as a possible factor that impacts adolescent sexual activity. The Jamaican secondary education system consists of two major types of high schools which are differentiated by the system of admission and the academic quality of the schools. Students who perform well in the National Assessment Examination taken at the end of elementary school attend academically rigorous secondary high school and technical high schools which prepare them for college. On the other hand, admission to new secondary (now comprehensive high schools) providing a mixture of academic and vocational training is gained from feeder schools and those who did not perform well on the National Assessment Examination with little chance of continuing their education beyond the secondary level (Eggleston,
Jackson, & Hardee, 1999). Researchers in adolescent sexuality in Jamaica have associated the type of school attended with social class. With children from lower socioeconomic strata more likely than those from middle and upper class families to attend new secondary/comprehensive high schools (Eggleston et al., 1999). Smith (1993) reported that students attending these schools are more likely than students at traditional high schools to suffer from low esteem, a trait that may be related to early sexual activity and pregnancy (Kinsmann, 1990). No recent study conducted among Jamaican high school students has validated these assumptions.

The objective of this study is to identify socio-demographic and family factors associated with sexual activity among adolescents in rural Jamaica, using the social ecological systems model as explicated by Bronfenbrenner (1979). This model consists of four levels of interconnected systems. The individual level includes personal characteristics such as biological, cognitive and emotional factors. The family level consists of family structure, communication and parental monitoring of adolescent activities. The extra-familial level includes factors like neighborhood quality, peer group behaviors, the school, and religious institutions. The broad society level consists of influences such as the media, socio-cultural, and socioeconomic factors. Based on this theoretical assumption and the reported findings in the literature, we hypothesized that family factors will influence adolescents’ initiation of sexual activity in Jamaica.
Methods

Sample Selection and Field Procedure

Our study is a secondary analysis of data collected in the summer of 1998 for the “Hanover Teen Study” (Stallworth, Roofe, Clark, Ehiri, Mukherjee, Person, & Jolly, 2004). The Hanover Teen Study was based on a cross-sectional survey of rural adolescent males and females attending different types of high schools in the parish of Hanover, Jamaica, to identify factors associated with adolescent sexual activity in the parish. A multi-stage sampling technique yielded 788 students who participated in the study. First, Hanover the most rural parish among other rural parishes in Jamaica was selected for this study. Next, schools in this parish were grouped into two: (1) comprehensive (formerly new secondary schools) and (2) secondary high/technical high/agricultural high schools, based on methods of student admission into these schools. Students who performed well in the National Assessment Examination taken at the final class in elementary school attends academically rigorous secondary high school and technical high schools which prepare them for college. On the other hand, admission to new secondary (now comprehensive high schools) providing a mixture of academic and vocational training is gained from feeder schools and those who did not perform well on the National Assessment Examination with little chance of continuing their education beyond the secondary level (Eggleston et al., 1999).

To identify any potential problem in the comprehension of the survey by the target population, it was tested using fifty students from one of the schools that were not part of the study. These students and their parents were asked to give their informed consent before participation in the pre-testing, and they were asked to complete an
evaluation form. Based on the results of the pre-testing and review of the evaluation forms, the investigators were able to identify that many young adolescents could not read well enough to complete a self administered questionnaire (Stallworth et al., 2004).

Documentation of parental consent was obtained from the students before their participation. Informed consent was also obtained from the students and a copy was made available for each of them to take home. Participants were informed that they were free not to answer any question that will cause them discomfort and that they have the right to terminate their participation in the study at any point if they wish. Investigators read the questions and the possible responses aloud to the participants on the day of the administration of the survey.

The surveys were completed at each school site in a large classroom under the supervision of the study staff to prevent participants from sharing information on their response to the questions. No teacher or any other school personnel were present during the time the survey was administered in order to not influence the response of the students. Data obtained during this survey was assessed for completeness and consistency and was entered into Statistical Package for the Social Sciences (SPSS) database. The Institutional Review Board (IRB) at the University of Alabama at Birmingham (UAB), and the Ethics Committee, Ministry of Health, Jamaica approved the protocol for this study prior to implementation.

**Instruments and Measures**

The survey instrument was developed based on a comprehensive literature review on factors associated with adolescent sexual activity and was guided by the
Bronfenbrenner’s Social Ecological Model (Bronfenbrenner, 1979). The self-report questionnaire included questions on socio-demographic and family context variables.

**Socio-demographics**

Socio-demographic data was collected on variables such as current age, gender, type of school attended, family structure, and adolescent leisure (after school) activities. Type of school attended in this study is defined as comprehensive versus other high schools (technical and agricultural). Questions on leisure activities such as going straight home after school, hanging out with classmates, hanging out with girlfriend/boyfriend were answered “yes or no”.

**Family Context Variables**

Family structure was measured by whether the adolescent lived in an intact two-parent family or not. We defined intact family as married biological parents living in the same household with the adolescent. Adolescents were asked to answer “yes or no” if their parents discuss sexual issues with them.

Parental monitoring and supervision of adolescent activities was measured on three items to determine the extent to which parents know their child’s whereabouts, how much interest they show in who they spend time with, and what they do during their free time. An example of this item is “My parents know where I go after school and weekends”. Response options range from 1 (all the time) to 5 (none of the time). A composite variable based on the sum of these three items was constructed to determine
the level of monitoring of adolescents’ activities by the parents. A high score on these scale is considered as lack of parental supervision/monitoring (Cronbach’s alpha = 0.54)

*Outcome Variable*

For this study, the outcome of interest is initiation of sexual intercourse. We obtained this information from the response of adolescents to the question “Have you ever had sex?” (Yes/No). Those who answered “Yes” were reported as sexually experienced, and those who answered “No” were referred to as sexually abstinent. We defined sex in this study as a penis entering the vagina. Given the sensitive nature of questions related to sexual behavior, these questions were asked at the end of the survey after questions about adolescent’s socio-demographic and family characteristics had been answered.

*Sample*

The data generated from this study was analyzed for missing responses using the SPSS frequency procedure. Out of the original 788 participants, we excluded 40 (5.1%) with incomplete data on the outcome and key predictor variables from the analysis. For the 748 individuals remaining for analysis, missing data appeared to be randomly distributed across gender groups. In order to enhance statistical power, we replaced missing values for continuous variables by substituting the mean response given by respondents of the same gender. Overall the range of missingness for continuous explanatory variables for this specific aim was between 1.2% and 2.1%. The largest (2.1%) is attributed to age at time of survey.
Statistical Analysis

Frequency distributions were computed for the selected socio-demographic and family characteristics and coital status. Mean values and standard error of the mean (SEM) were calculated for continuous variables. We assessed the bivariate association of these characteristics and sexual experience using Chi-square statistics for categorical variables and t-test for continuous variables. We then proceeded to perform logistic regressions between the outcome variable and each of the explanatory variables (bivariate) and between the outcome variable with all explanatory variables in the model (multivariate) to estimate crude and adjusted odds ratio (OR) with 95% confidence intervals (CI). In both the bivariate and multivariate analysis, being sexually experienced was the dependent variable. Gender, age, activities engaged in after school, the type of school attended, family context measures such as family structure, parental monitoring, and discussion of sexual issues with parents were the explanatory variables. All covariates were entered into the multivariate regression model. In the final model, insignificant variables were eliminated using stepwise and backward strategy with a 10% cut-off margin. Variables in the final model were fitted for each gender, to assess effect modification. All tests were two-tailed, and a p-value of 0.05 or less was considered as statistically significant. The Nagelkerke ($R^2$) statistics was used to measure the strength of the association predicted by the final model. Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS 14; SPSS Inc., Chicago, Illinois).
Results

Descriptive Analysis

Of the 748 participants included in analysis approximately two-thirds (65%) were females, with age ranging from 14-19 years. The mean age of participants was 16 years and almost two-thirds (63%) were sexually experienced. Among males 80% were sexually experienced, while 53% of females had initiated sexual intercourse. On average, sexually experienced teens were older than their sexually abstinent peers. The mean age was 16.5 years and 16.0 years respectively. Mean age at sexual initiation was 14 years (11 years for boys and 15 years for girls). The majority of the adolescents (73%) were attending comprehensive high schools, while the remaining were students of technical and agricultural high schools. The proportion of sexually experienced adolescents who reported discussing sexual issues with their parents was less than those who were sexually abstinent (62% vs. 69%). Less than half (42%) of the students reported living in intact two-parent households with their biological parents. Of those who lived with their parents only 36% were sexually experienced. Adolescents who were sexually experienced had higher mean scores on the parental monitoring scale (6.0 ± 0.1), compared to those who were yet to initiate sexual activity (5.2 ± 0.1). Table 1 summarizes the results for the associations of various predictor variables and coital status.

Regression Analysis

At the bivariate level all characteristics examined were significantly associated with sexual debut (p≤0.05). When all of the variables were entered into a multivariate
analysis only age, gender, hanging out with boyfriends/girlfriends, family structure, and lack of parental monitoring remained significant (p<0.05). Unadjusted and adjusted odds ratios for these variables are presented in Table 2. The effect of the key variables such as age, gender, family structure, and parental monitoring were not confounded by other covariates included in the model, as the crude and adjusted odds ratio for these variables did not differ appreciably from each other.

The result of the final predictive model and the assessment of effect modification are presented in Table 3. All variables that were significant at the multivariate level remained significant in the overall final model. The role of hanging out with boyfriend or girlfriend as risk factor for initiation of sexual activity was substantially modified by gender. Transition to sexual activity among girls correlated significantly with older age (OR= 1.54, CI= 1.29-1.84), hanging out with boyfriends (OR= 2.27, CI= 1.37-3.76), and lack of parental monitoring (OR= 1.20, CI= 1.07-1.35). Living in the same household with both parents was protective (OR= 0.45, CI= 0.30-0.67). For boys, being older (OR= 1.47, CI= 1.07-2.02) and lack of parental monitoring (OR= 1.19, CI= 1.01-1.39) were significant predictors of initiation of sexual activity. The overall predictive efficacy of the final model was 24%.

Discussion

The primary objective of this study was to identify individual and family level factors associated with teenage sexual activity in rural Jamaica. Our results show gender differences in the predictors of sexual experience. More variables significantly predict sexual activity for females than males. Four of the predictor variables were found to be
significant for females, while only two were significant for males. Fewer predictors of transition to sexual intercourse were reported by Small and Luster for male compared to female adolescents in their study of adolescent sexuality among US high school students (Small & Luster, 1994). Girls who had initiated sex were strongly influenced by both individual and family factors. This is in agreement with previous studies that combined individual and family variables (Werner-Wilson, 1998). Understanding these differences can help in the planning of intervention programs to delay adolescent sexual activity.

Overall, the data supported the predicted association between family characteristics and adolescent sexual activity. Sexually experienced female adolescents were less likely to reside with their biological parents. These findings confirmed earlier statements with regards to the Jamaican family (McNeil, Olfason, Powell, & Jackson, 1983; UNICEF, 2002), and is consistent with previous research on the effect of family structure on initiation of sexual intercourse (Velez-Pastrana, Gonzalez-Rodriguez, & Borges-Hernandez, 2005; Santelli, Lowry, Brener, & Robin, 2000). Compared to living in single-parent house-hold, living with both parents has been reported to be associated with less sexual activity, especially among adolescent girls (Davis & Friel, 2001), a situation that has been linked to the stable social, emotional, and economic support that two-family households provide (Young, Jensen, Olsen, & Cundick, 1991). Most families in Hanover are single mother households (UNICEF, 2002); the absence of the father in most homes could also explain the gender difference in our study. The absence of the father has been reported to place daughters at special risk for early sexual activity, and conversely protective against early sexual outcomes (Ellis, Bates, Dodge, Fergusson, Horwood, Pettit, & Woodward, 2003; Dittus, Jaccard, & Gordon, 1997). Paternal disapproval of
premarital sex has been suggested as a possible mediating pathway for this association (Ellis et al., 2003; Dittus, Jaccard, & Gordon, 1997; Loewenson, Ireland, & Resnick, 2004).

An important finding that was not modified by gender status in this study was the association between parental monitoring and initiation of sexual intercourse. Consistent with previous studies, the quality of supervision and monitoring of adolescent activities was associated with sexual experience (Meschke & Silbereisen, 1997; Velez-Pastrana et al., 2005; Sieverding, Adler, Witt, & Ellen, 2005). As suggested by previous authors (Meschke & Silbereisen, 1997; Velez-Pastrana et al., 2005), when parents have knowledge of their child’s whereabouts, activities, and friends, it provides them with the opportunity to monitor, and thereby influence the delay in initiation of sexual activity. Monitoring of adolescent activities by parents has been reported to be significantly associated with lower social expectations to have sex (Sieverding et al., 2005). Based on our findings, we suggest more involvement of parents in the monitoring of their adolescents in order to delay initiation of sexual activity.

Another finding that was not impacted by gender was the current age of participants. Sexually experienced adolescent males and females were significantly older than their sexually abstinent peers. This however, is to be expected since the proportion of adolescents that initiate sexually activity increases with age. In Jamaica for instance, by age 15-19 years, 63% of girls and 83% of boys had been reported to have had sexual intercourse (Adolescent Condom Survey Jamaica, 2001).

Socio-romantic leisure activity (hanging out with boyfriends) was predictive of sexual initiation for girls. Previous authors had reported similar findings in their own
Probable explanations for this association could be the ample times spend alone with boyfriends. Being alone with a boyfriend could lead to kissing and touching, the experienced pleasurable feelings could heighten curiosity and experimentation with sex (Marin, Kirby, Hudes, Coyle, & Gomez, 2006). In order to reduce the risk of sexual activity, adolescents, especially females should be encouraged to delay serious romantic relationships. In our study, the type of school attended was not independently associated with initiation of sexual intercourse, contrary to what has been generally assumed about the school system in Jamaica (Eggleston et al., 1999; Smith, 1993).

Limitations, Implications, and Future Directions

The limitations of the design and data collection require cautionary interpretation of findings from this study. We relied on self-reports of adolescent sexual activity. It is probable that adolescents may give socially acceptable answers to matters such as sexual activity, or they may embellish their experience. We however, did take steps to minimize this effect by entrenching anonymity in the study design, and by not involving the school staff in data collection. Non-response to some questions and the missing data generated, are also limitations. The statistical replacement of missing values by using means minimized the effect of power lost due to listwise deletion, but reduced variability and introduced bias. Parental socio-economic status, a key family variable was not assessed in this study. We presume that there will not be much difference in the family socio-economic status of the participants as they all live within a rural setting. Sexual activity in this study was limited only to vaginal sex — the non-inclusion of adolescents who had
experimented with oral or anal sex could have underestimated sexual activity other than vaginal intercourse in this population. Finally, the cross-sectional design of this study may be a major limitation as only association, but not causal inferences can be made.

Our study was a unique opportunity to study sexual behavior of rural adolescents in Jamaica, who were always underrepresented in previous studies. While the findings may not be representative of all adolescents from different socio-economic and demographic backgrounds in the country, the findings definitely provide insight into the sexual behavior of adolescents within this sub-set of the Jamaican society that we studied. A major strength is the assessment of socio-demographic and family variables at the same time, thereby reducing the number of unmeasured covariates that could bias our findings. However, our multivariate model accounted for 24% of the variations in engagement in sexual activity, so we can not assume that the factors examined here are the only ones affecting initiation of sexual activity.

This study makes an important contribution to the understanding of factors associated with sexual initiation among rural Jamaican adolescents. Our findings indicate that sexual activity during adolescence is common among rural Jamaican adolescents, with similarities in proportion and predictors to what has been reported among comparable populations in the United States. To delay initiation of sexual intercourse, intervention programs must recognize these factors and implement an all-inclusive prevention strategy that can adequately address the social and cognitive needs of both sexes. The cost of adolescent pregnancy and sexually transmitted infections is enormous in a developing country like Jamaica, it is imperative that early initiation of sexual activity should be discouraged.
In addition to the ongoing Family Life Education curriculum in Jamaican schools, we recommend a comprehensive approach that is age, gender and developmentally appropriate. Parents, schools, health providers, and the youths themselves should be involved in programs’ design and implementation. The media, religious organizations, and policy makers should also play key roles in the prevention partnership.

References


<table>
<thead>
<tr>
<th>Characteristic, N (%) or mean ± SEM&lt;sup&gt;a&lt;/sup&gt;</th>
<th>All (N=748)</th>
<th>Yes (N=469)</th>
<th>No (N=279)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-demographic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at time of survey</td>
<td>16.3± 0.04</td>
<td>16.5± 0.06</td>
<td>16.0± 0.06</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Female</td>
<td>484 (64.7)</td>
<td>258 (55.0)</td>
<td>226 (81.0)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Attending comprehensive high school</td>
<td>545 (72.9)</td>
<td>321 (68.4)</td>
<td>224 (80.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Goes straight home after school</td>
<td>559 (74.7)</td>
<td>335 (71.4)</td>
<td>224 (80.3)</td>
<td>0.007</td>
</tr>
<tr>
<td>Hangs out with classmates</td>
<td>264 (35.3)</td>
<td>179 (38.2)</td>
<td>85 (30.5)</td>
<td>0.03</td>
</tr>
<tr>
<td>Hangs out with boyfriend or girlfriend</td>
<td>177 (23.7)</td>
<td>139 (29.6)</td>
<td>38 (13.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discuss sexual matters with parents</td>
<td>481 (64.3)</td>
<td>289 (61.6)</td>
<td>192 (68.8)</td>
<td>0.05</td>
</tr>
<tr>
<td>Living with both parents</td>
<td>312 (41.7)</td>
<td>169 (36.0)</td>
<td>143 (51.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Parental monitoring&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.7 ± 0.1</td>
<td>6.0 ± 0.1</td>
<td>5.2 ± 0.1</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

<sup>a</sup>Standard error of the mean.

<sup>b</sup>A sum of scores of three items representing parental monitoring (higher score represent lack of parental monitoring)
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unadjusted (N=748)</th>
<th>Adjusted&lt;sup&gt;c&lt;/sup&gt; (N= 748)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR&lt;sup&gt;a&lt;/sup&gt;</td>
<td>95% CI&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Age at time of survey in years</td>
<td>1.5</td>
<td>1.31-1.74</td>
</tr>
<tr>
<td>Female vs. male</td>
<td>0.3</td>
<td>0.20-0.41</td>
</tr>
<tr>
<td>Comprehensive high school vs. others</td>
<td>0.5</td>
<td>0.37-0.76</td>
</tr>
<tr>
<td>Goes straight home after school</td>
<td>0.6</td>
<td>0.43-0.88</td>
</tr>
<tr>
<td>Hangs out with classmates</td>
<td>1.4</td>
<td>1.03-1.93</td>
</tr>
<tr>
<td>Hangs out with boyfriend or girlfriend</td>
<td>2.7</td>
<td>1.80-3.97</td>
</tr>
<tr>
<td>Discuss sexual matters with parents</td>
<td>0.7</td>
<td>0.53-1.00</td>
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<tr>
<td>Living with both parents</td>
<td>0.5</td>
<td>0.40-0.72</td>
</tr>
<tr>
<td>Parental monitoring</td>
<td>1.3</td>
<td>1.17-1.39</td>
</tr>
</tbody>
</table>

<sup>a</sup>OR: Odds ratio  <sup>b</sup>CI: Confidence Interval.  <sup>c</sup>Adjusted for all characteristics listed in this table.
### TABLE 3 Final model predicting initiation of sexual intercourse stratified by gender

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall (N=748)</th>
<th>Male (N=264)</th>
<th>Female (N=484)</th>
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</thead>
<tbody>
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<td></td>
<td>OR&lt;sup&gt;a&lt;/sup&gt;</td>
<td>95% CI&lt;sup&gt;b&lt;/sup&gt;</td>
<td>p-value</td>
</tr>
<tr>
<td>Female</td>
<td>0.26</td>
<td>0.18-0.37</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Age at time of survey</td>
<td>1.51</td>
<td>1.30-1.76</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Hangs out with boyfriend or girlfriend</td>
<td>2.06</td>
<td>1.35-3.17</td>
<td>0.001</td>
</tr>
<tr>
<td>Living with both parents</td>
<td>0.50</td>
<td>0.36-0.70</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Parental monitoring</td>
<td>1.19</td>
<td>1.08-1.31</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Model statistics</td>
<td>Nagelkerke R&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.24*</td>
<td>0.09*</td>
</tr>
</tbody>
</table>

<sup>a</sup>OR: Odds ratio  <sup>b</sup>CI: Confidence Interval. *R<sup>2</sup> change is based on Nagelkerke’s statistics.
THE DETERMINANTS OF SEXUAL INTERCOURSE BEFORE AGE 16 YEARS AMONG RURAL JAMICAN ADOLESCENTS

OLANIYI J. EKUNDAYO, JOANA DODSON-STALLWORTH, MICHELE ROOFÉ, INMACULADA B. ABAN, LAURA H. BACHMANN, JOHN E. EHIRI, MIRJAM C. KEMPF AND PAULINE E. JOLLY

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Format adapted for dissertation
OBJECTIVE: Individual and family factors have been hypothesized to influence adolescent sexual behavior, but the extent to which this is true for adolescents in Jamaica as a whole and for those in rural areas in particular, has not been well studied. The objective of this study was to identify individual and family factors associated with initiation of sexual activity before the age of 16 among rural adolescents in Jamaica.

METHOD: We analyzed data for 469 sexually experienced adolescents attending public high schools in the rural parish of Hanover. Multivariate logistic regression was used to predict independent influences of these factors.

RESULTS: The mean age at sexual debut was 11 years for boys and 15 years for girls. Early adolescent sexual activity was associated with liberal attitude about negative sexual outcomes (OR = 1.96, 95%CI = 1.34-2.87) and first sexual partner not being a steady boyfriend or girlfriend (OR = 4.19, 95%CI = 1.62-10.84). Female gender (OR = 0.16, 95%CI = 0.07-0.36) and older age at time of survey were protective (OR = 0.40, 95%CI = 0.32-0.52). Girls who were early starters were more likely to have been initiated by partners who were not steady boyfriends. They also reported liberal attitude towards negative sexual outcomes. Boys were mainly influenced by liberal attitude towards negative sexual outcomes. Being older was protective for both genders.

CONCLUSION: Considering the high rates of HIV and adolescent pregnancy in this population, reproductive health programs that attempt to delay the age at first sex should begin early in primary school before adolescents become sexually active.

KEYWORDS: Adolescents; early sexual debut; rural Jamaica.
Introduction

In the past three decades, there has been a considerable decline in the age at which adolescents initiate first sexual intercourse, both in developed and developing countries (Centers for Disease Control and Prevention (CDC), 1998; Eggleston, Jackson, & Hardee, 1999). Early initiation of sex expose teenagers to the risk of unintended pregnancy (Santelli, DiClemente, Miller, & Kirby, 1999) and sexually transmitted infections (STIs), including Human Immunodeficiency Virus (HIV) (Santelli et al, 1999). Adolescent child bearing has been linked to higher rates of stillbirth (Salihu, Sharma, Ekundayo, Kristensen, Badewa, Kirby, & Alexander, 2006), maternal and child morbidity and mortality, limited life opportunities, and lower socio-economic status (Botting, Rosato, & Wood, 1998). Research efforts in recent years, especially in developed countries, have been directed towards identifying factors associated with early adolescent sexual activity and mounting programmatic strategies to modify sexual behavior.

Globally, early adolescent sexual activity and teenage pregnancy remains a recurring public health issue. In Jamaica for instance, available data indicates that adolescents initiate sexual activity early and engage in risky sexual behavior. In the 2001 Adolescent Condom Survey, 63% of females and 83% of males 10-19 years old reported having had sexual intercourse (Adolescent Condom Survey, 2001). In another study, adolescent males reported earlier onset of sexual activity than females, with mean age at first intercourse as low as 9.4 years for boys and 11.3 years for girls (Eggleston et al., 1999). In the Adolescent Condom Survey, only 42% of respondent 15-19 years old and 26% of those 10-14 years old used contraceptives the first time they had sexual
intercourse (Adolescent Condom Survey, 2001). Consequently, the pregnancy rate among Jamaican adolescents (79 live births per 1,000) although declining, compared to 112 per thousand in 1997, still represents one of the highest in the Caribbean (United States Agency for International (USAID), 2005). In fact adolescent pregnancy in this country has been described as a social and public health problem (Jackson, Leitch, Lee, Eggleston E, & Hardee, 1998). Research findings indicate that before they reach the age of 20 years, 40% of Jamaican women have been pregnant at least once, and over 80% of these adolescent births are mistimed or unwanted (McFarlane, Friedman, Goldberg, & Morris, 1999). In Hanover, the most rural parish in Jamaica, approximately 25% of the births in 1997 were to teen mothers (Hanover Health Department, Annual Report, 1997).

Apart from the health consequences of teenage childbearing, the social consequences are also enormous for the Jamaican adolescent mother. They are often limited economically, usually abandoned by partners, and frequently unable to complete school. For instance among ever-pregnant adolescent females in the country, almost one-third became pregnant while still in school, and only 16% of these returned to school after the birth of their child (Jackson et al., 1998). The majority of teenage pregnancies are often unintended and as a result many teenagers are often desperate and willing to risk their life to terminate them (McFarlane et al., 1999). In Jamaica, abortion is only legal for medical reasons and therefore pregnant adolescents often seek illegal abortions from untrained and unqualified personnel who conduct abortions under unsafe conditions. The resulting infections and complications have been reported as an important cause of maternal morbidity and mortality in the country (McFarlane et al., 1999; International Planned Parenthood Federation (IPPF), 1999).
Finally, early teenage sexual activity is associated with a higher likelihood of subsequent unprotected sex and multiple sexual partners, putting adolescents at risk for STIs including HIV. Most AIDS cases in Jamaica occur among young people ages 20 to 39, meaning that most people are infected with HIV as adolescents and young adults (National HIV/STI Prevention and Control Program, 2006). In 2004, HIV was the second leading cause of death for both young men and women in Jamaica (age group 15-24 years old) (National HIV/STI Prevention and Control Program, 2006). The small, rural parish of Hanover has the third highest rate (217.1/100,000 population) of HIV infection in the country (Ministry of Health Annual Report, 2001).

In Jamaica, the only available study conducted to identify predictors of early sexual intercourse was based on retrospective information from women aged 15 to 50 years, with potential limitation of recall bias (Wyatt, Durvasula, Guthrie, LeFranc, & Forge, 1999). Most information has been derived largely from qualitative research and anecdotal evidence (Jackson et al., 1998; Kempadoo & Dunn, 2001). No empirical research has been conducted to quantitatively identify correlates of early sexual debut among Jamaican adolescents who had recently experienced intercourse particularly in a rural setting. Findings from qualitative studies confirmed that a combination of individual and family level factors is associated with early sexual activity (Jackson et al., 1998; Kempadoo & Dunn, 2001). Early coitus for girls has been reported to be associated with sex in exchange for money to meet economic needs, exploitation by male relatives, sexual curiosity, seeking fun and pleasure, love and affection, pressure (from boys, peers and adult men), force and physical violence, desire to have a baby, and lack of parental monitoring (Jackson et al., 1998; Kempadoo & Dunn, 2001). On the other hand, boys
were mostly motivated by pleasure, wanting to have a baby, peer pressure and economic gains from older females (Jackson et al., 1998; Kempadoo & Dunn, 2001).

In this study, our goal was to identify factors predicting early initiation of sexual activity among high school adolescents in the rural parish of Hanover, Jamaica, a parish with high rates of adolescent pregnancy and STIs. We compared those who had sexual experience before the age of 16 - the age of legal consent in Jamaica (Ward, 2001) with those who initiated sexual intercourse at age 16 and older. We hypothesized that male adolescents would initiate sexual activity early compared to their female counterparts.

Methods

Participants

The participants in this study were part of “The Hanover Teen Study” conducted to identify factors associated with adolescent sexual activity in Jamaica (Stallworth, Roofe, Clark, Ehiri, Mukherjee, Person, & Jolly, 2004). Briefly the study was a cross-sectional survey of students attending different types of public high schools in the rural parish of Hanover, Jamaica. Schools in the parish were grouped based on method of admission. The schools selected for participation in this study were comprehensive high schools formerly new secondary schools (group 1), and technical and agricultural high schools (group 2). Students who perform well in the National Assessment Examination taken at the end of elementary school attend academically rigorous secondary high school and technical high schools which prepare them for college. On the other hand, admission to new secondary (now comprehensive high schools) providing a mixture of academic and vocational training is gained from feeder schools and those who did not perform well
on the National Assessment Examination with little chance of continuing their education beyond the secondary level (Eggleston et al., 1999). Seven hundred and eighty eight students attending the selected schools participated in the survey. For the purposes of this study, the 469 participants who indicated that they had previously engaged in sexual intercourse were included in the analysis. However, we also defined composite scores for this study by taking sums of measures. The internal consistencies of these measures were assessed using Cronbach’s alpha (Cronbach, 1951) based on data available for the original 788 participants.

Procedure

The protocol for this study was reviewed and approved by the institutional review board (IRB) of the University of Alabama at Birmingham and the Ethics Committee, Ministry of Health, Jamaica. Written informed consent from parents and the students were obtained. Questions were read to the students to account for low literacy among some students which was detected during pre-testing. To guarantee confidentiality, students did not put their name on the questionnaires and the investigators, and not the teachers, administered and collected the questionnaires. The procedure used for data collection and quality control has been described previously (Stallworth et al., 2004).

Instruments and Measures

The survey instrument for this study was developed based on a comprehensive review of the literature on factors associated with adolescent involvement in sexual
activity. The self-report questionnaire included questions on socio-demographic, individual, and family context variables.

**Socio-demographics**

Socio-demographic data was collected on variables such as current age, gender, type of school attended, and adolescent leisure (after school) activities. The type of school attended in this study was defined as comprehensive versus other high schools. Questions on leisure activities such as going straight home after school, hanging out with classmates, hanging out with girlfriend/boyfriend were answered “yes or no”. Adolescents were asked to indicate the characteristic of their first sexual partner. Response options include boyfriend/girlfriend, just a friend, a stranger, and relatives. This variable was dichotomized as boyfriend/girlfriend versus others.

**Family Context Variables**

Family structure was measured by whether the adolescent lived in an intact two-parent family or not. We defined intact family as biological parents living in the same household with the adolescent.

Parental monitoring and supervision of adolescent activities was measured using three items to determine the extent to which parents know their child’s whereabouts, how much interest they show in who they spend time with, and know what they do during their free time. An example of this item is “My parents know where I go after school and weekends”. Response options range from 1 (all the time) to 5 (none of the time). A composite variable based on the sum of these three items was constructed to determine
the level of monitoring of adolescents’ activities by the parents. Cronbach alpha statistic was used to determine the internal consistency of the items (Cronbach, 1951). A high score on this scale is considered as lack of parental supervision/monitoring (Cronbach’s alpha = 0.54)

Perception of parental affection and support was a four-item measure (each for the mother and the father). An example would be: “I feel loved by my mother/father.” Response options to these questions range from 1 (all the time) to 4 (none of the time). Adolescents who were not living with their biological parents were asked to substitute “primary female or male guardian” for “mother/father”. Scores were combined separately for each parent to evaluate the level of affection between the adolescent and each of their biological or surrogate parents. High scores indicate lack of maternal affection and support (Cronbach’s alpha = 0.74) and lack of paternal affection and support (Cronbach’s alpha = 0.83).

Psychosocial Variables

Adolescents’ norms towards abstaining from sex were assessed with five items. A sample question is “Do you think teenagers should wait until they are older than 18 years to start having sex?” Response options range from 1 (yes) to 3 (no). A composite variable based on the sum of scores on these items was constructed to determine adolescents’ attitudes towards premature sex. High scores indicate permissive sex norms (Cronbach’s alpha = 0.80).

Norms about negative sexual outcomes was a two-item scale that assessed adolescents’ attitude towards teenage pregnancy (e.g., “Do you think you would feel
really badly if you get pregnant or if you get someone pregnant as a school boy”).
Response options range from 1 (yes) to 3 (no). A combined variable based on the sum of scores on these two items was constructed to determine adolescents’ feelings towards negative sexual outcomes. A high score is interpreted as liberal attitude towards negative sexual outcomes and indicates adolescents’ lack of worries about getting pregnant or making somebody pregnant (Cronbach’s alpha = 0.59). The sex norms and negative sexual outcomes scales is based on the Alabama Rural Youth Survey instrument with reported reliability of 0.69 to 0.78 (Nagy, Watts, & Nagy, 2003).

We used a short form of the Beck’s Depression inventory II (BDI II) to measure depressive symptoms (Beck, Brown, & Steer, 1996). The depressive symptom measure consisted of three-items (sadness, tiredness, and suicidal thoughts). BDI II measures the severity of self-reported depression in adolescents and adults. The three symptoms were selected based on their high loadings on factor analysis (Beck et al., 1996) and ease of response by adolescents. Respondents were asked to describe themselves in relation to these symptoms in the past two weeks including the day of the interview. Each symptom is rated on a 4-point scale ranging from 0-3 (Cronbach’s alpha = 0.79). A high score is defined as reporting depressive symptoms.

**Outcome Variable**

For this study, the outcome of interest is whether first sexual intercourse is experienced early or late. We defined early sexual debut as initiation of sexual intercourse before age 16 and late sexual debut as initiation of sexual intercourse at age 16 and above. We obtained this information from the response of adolescents to the
question “Have you ever had sex?” (Yes/No). This question was followed by: If yes, how old were you the first time you had sex (age in years)? In this study, sex was defined as a penis entering the vagina. Given the sensitive nature of questions related to sexual behavior, these questions were asked towards the end of the survey after questions about adolescents’ personal and family characteristics had been answered.

**Statistical Analysis**

Frequency distributions were computed for selected socio-demographic characteristics. Mean values and standard errors of the mean (SEM) were calculated for continuous variables. We used Pearson’s chi-square and t-tests to test the statistical significance of the differences of these characteristics and age at sexual debut. We then performed logistic regressions between the outcome variable and each of the explanatory variables (bivariate) and between the outcome variable and all explanatory variables in the model (multivariate) to estimate crude and adjusted odds ratio (OR) with 95% confidence intervals (CI). We presented the results as unadjusted and adjusted ORs with 95% CI, to enable the assessment of the stability of the association when all covariates were adjusted for in the model. The final prediction model for early versus late sexual debut was reported. In the final model, variables were eliminated using stepwise and backward strategy with a 10% cut-off margin. Variables in the final model were fitted for each gender, to assess effect modification. All tests were two-tailed, and a p-value of 0.05 or less was considered statistically significant. The Nagelkerke’s ($R^2$) statistic which measures how much variation in the dependent variable the model accounts for was used in this study to assess the strength of the association predicted by the final model.
Results

Of the 469 sexually active adolescents, 45% (n= 211) were males and 55% (n= 258) were females. The mean age at initiation of sexual intercourse for males and females was 11 and 15 years respectively. The results of the comparison tests for the variables according to age at sexual debut are presented in Table 1. Overall, girls were less likely to initiate sexual intercourse early compared to boys (p<0.0001). Early starters were younger (at the time of the survey) than the late starters (p<0.0001), mean age 16 and 17 years respectively. They were more likely to report first intercourse with persons other than steady boyfriends or girlfriends (p<0.0001), attended comprehensive high schools (p<0.0001), reported permissive norms about negative sexual outcomes (p<0.0001) and lack of parental monitoring (p=0.003). In comparison to late starters, early starters were less likely to go straight home after school (p=0.003) and less likely to live with their biological parents (p=0.02).

The ORs for age, gender, and permissive norms about negative sexual outcomes as a predictor of early sexual debut remained stable and significant after adjusting for all individual and family level variables. The unadjusted OR for relationship with partner at first intercourse was significant but with wide CIs, accounting for the small sample of late debutants initiating sex with partners other than steady boyfriend or girlfriend. After adjusting for other covariates, the OR and CI declined but remained statistically significant. The OR between parental monitoring, maternal affection and support, and
paternal affection and support, and early sexual debut remained stable after adjusting for other covariates, but did not support significant association with early sexual debut. The effects of family structure, going home after school, and the type of school attended diminished and were no longer significant in multivariate analysis (Table 2). 

The result of the final predictive model is presented in Table 3. All variables that were significant at the multivariate level remain significant in the overall final model with some effect modification by gender. Female adolescents who engaged in sexual activity early were more likely to have been initiated by a partner other than a steady boyfriend (OR= 11.95, 95% CI= 2.39-59.69), and had permissive norms about negative sexual outcomes (OR= 1.83, 95% CI= 1.21-2.77). Males were mainly influenced by permissive norms towards negative sexual outcomes (OR= 3.11, 95% CI= 1.09-8.93). Being older at the time of survey appears to be protective for both genders. The overall model has a predictive efficacy of 48%.

Discussion

We investigated factors associated with initiation of sexual intercourse before the age of 16 among rural Jamaican adolescents, based on an increasing concern regarding negative consequences of early sexual debut in this population. Our findings indicate that early sexual experience is common. The mean age at first sexual intercourse was 11 years for boys and 15 years for girls. This is in agreement with findings from previous adolescent surveys in the country (Adolescent Condom Survey, 2001; Eggleston et al. 1999). These findings have implications for prevention of adolescent pregnancy and STIs.
- programs that attempt to delay age at first sex need to start early in primary school, before young people reach puberty or become sexually active.

An interesting finding is the association of type of first sexual partner and early sexual debut among female adolescents. Girls whose first sexual partner was not a steady boyfriend were more likely to be early starters. Type of early sexual partners reported in focus group discussions (FGDs) by Jamaican female adolescents included family members and other older men in the community (Kempadoo & Dunn, 2001), suggesting that such relationships could be coercive or transactional. According to the Jamaican Injury Surveillance System, 86% of sexual assault cases in 2002 and 2003 were committed by a relative, a friend, an acquaintance or an intimate partner (Amnesty International, 2006). We cannot determine the extent to which sexual intercourse with people other than steady partners represent coerced or transactional sexual relationships from our data. Further investigation is required to fully understand this association.

Another important finding, similar to reports from previous qualitative studies is the liberal attitude of some Jamaican adolescents towards negative sexual outcomes, such as pregnancy. In our study, male and female adolescents with permissive norms about negative sexual outcomes reported early coital debut, the association however was stronger for boys than for girls. Jackson et al (1998) in their report of FGDs conducted among Jamaican high school students reported that boys were more likely than girls to express enthusiasm about an unexpected pregnancy (Jackson et al., 1998). Male participants in the discussion reported that a boy who impregnated a girl is often the object of his ‘friends’ admiration and envy. Similar observation was reported by Kempadoo and Dunn (2001). Girls bear the consequences of adolescent pregnancy more
than boys; this could explain why they are not as enthusiastic by the prospect of being pregnant as boys. In Jamaica, culture and gender norms impose different standards on males and females. Males have been reported to have a macho attitude to sexuality and are egoistic about their sexual exploits (Jackson et al., 1998). Conservative sexual ideals, coexisting with tacit acceptance of early pregnancy in Jamaica, may promote this attitude towards adolescent pregnancy (Barnet, Eggleston, Jackson, & Hardee, 1996). It is probable that many adolescents might not have sex, if some norms concerning sexual behavior can be changed; however, the effectiveness of any strategy in changing norms will depend on whether there is agreement across age groups in society about the appropriate context for sexual behavior (Paul, Fitzjohn, Herbison, & Dickson, 2000).

Several of our hypothesized measures failed to distinguish between early and late initiators. The relationship found in some studies between family structure and early sexual intercourse was not obvious here (Wyatt et al., 1999). While it could be argued that family structure, particularly living in two-parent households could be related to whether or not one abstain from sex, in this study it did not influence the timing of first sexual experience. It is possible that we were unable to detect the association due to the small sample size of those who were debuting after age 16 and did not live with both parents. It may also suggest that early sexual debut is strongly determined by other factors (e.g. relationship with first sexual partner and attitude towards sexual outcomes) and that living in two parent families does not have as much influence. Several other studies have also reported lack of association between family structure and early sexual debut (Paul et al., 2000). One potential explanation of the lack of association between family structure and age of sexual debut is that the family environment of early starters
may actually not be protective. Young adolescents, especially females could have been initiated into sex by relatives or acquaintances (Kempadoo & Dunn, 2001). Similarly, we did not find any association between parental monitoring and early sexual debut.

The non-significance of an association between early sexual initiation and leisure activities, such as, hanging out with boyfriends, or classmates is notable. It again reinforced our finding that first sexual intercourse in early adolescence might not occur in a socio-romantic setting, especially for girls. Early sexual initiation may likely be coercive rather than romantic (Kempadoo & Dunn, 2001).

Against popular typecast, the type of school attended did not independently affect the timing of sexual initiation. It has been suggested that adolescents attending comprehensive high schools (formerly new secondary schools) are more likely to initiate sexual intercourse early because of the limited potential for further education associated with these schools (Eggleston et al., 1999). Students attending these schools had been reported to suffer from low self esteem (Smith, 1993), a trait that may be related to early sexual activity. This association which was significant at the bivariate level was insignificant in the multivariate analysis, indicating that some other characteristics of adolescents attending these schools may be different.

Limitations, Implications, and Future Directions

Limitations in the study design and data collection requires that findings should be interpreted with caution. We relied on self-reports of sexual activity. Due to the sensitive nature of some of the questions, some adolescents may give socially desirable answers. This tendency however, may have been minimized by the anonymity entrenched
in data collection. Insufficient power or small cell samples could also have affected some of our findings. Finally, the cross-sectional design of this study may be a major limitation as only association, but not causal inferences can be made.

Our study was a unique opportunity to study sexual behavior of rural adolescents in Jamaica, who have traditionally been underrepresented in previous studies. While the findings may not be representative of all adolescents from different socio-economic and demographic backgrounds in the country, the findings provide insight into the sexual behavior of adolescents within a sub-set of the Jamaican society. A major strength is the assessment of individual and family variables at the same time, thereby reducing the number of unmeasured covariates that could bias our findings. However, our multivariate model accounted for 48% of the variations in age at first intercourse, so we cannot assume that the factors examined here are the only ones affecting early initiation of sexual intercourse.

This research shows that individual factors (with slight modification for males and females), determine initiation of sexual intercourse before the age of 16 in Jamaica. None of the family level variables were independent risk or protective factors. Most sexually experienced adolescents in rural Jamaica engaged in their first sexual intercourse between the ages of 11 and 15, with males initiating sexual intercourse earlier than females. To maximize their preventive benefits, programs that attempt to delay age at first sex should begin early in primary school before adolescents become sexually active.

A major concern from our findings is that young female adolescents who engaged in sexual activity early were initiated by partners who were not steady boyfriends. Further research is required to determine the extent to which this represents coercive sexual
relations. Considering the high rates of HIV and adolescent pregnancy in this population, reproductive health programs are needed to meet the demand for information and services among these high risk youth.

References


<table>
<thead>
<tr>
<th>Characteristic, N (%)</th>
<th>All, N= 469</th>
<th>Age at first intercourse</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;16 years (N=367)</td>
<td>≥16 years (N=102)</td>
<td></td>
</tr>
<tr>
<td><strong>Age at time of survey</strong></td>
<td>16.5 ± 0.1</td>
<td>16.2 ± 0.1</td>
<td>17.4 ± 0.1</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>258 (55.0)</td>
<td>165 (45.0)</td>
<td>93 (91.2)</td>
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<tr>
<td>First sexual partner (not a steady boyfriend/girlfriend)</td>
<td>164 (35.0)</td>
<td>157 (42.8)</td>
<td>7 (6.9)</td>
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<tr>
<td>Attending comprehensive high school</td>
<td>321 (68.4)</td>
<td>275 (74.9)</td>
<td>46 (45.1)</td>
</tr>
<tr>
<td>Goes straight home after school</td>
<td>335 (71.4)</td>
<td>250 (68.1)</td>
<td>85 (83.3)</td>
</tr>
<tr>
<td>Hangs out with classmates</td>
<td>179 (38.2)</td>
<td>142 (38.7)</td>
<td>37 (36.3)</td>
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<tr>
<td>Hangs out with boyfriend or girlfriend</td>
<td>139 (29.6)</td>
<td>107 (29.2)</td>
<td>32 (31.4)</td>
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**Socio-demographic**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All, N= 469</th>
<th>&lt;16 years (N=367)</th>
<th>≥16 years (N=102)</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>Parental monitoring</td>
<td>6.0 ± 0.1</td>
<td>6.1 ± 0.1</td>
<td>5.8 ± 0.2</td>
<td>0.18</td>
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<tr>
<td>Living with both parents</td>
<td>169 (36.0)</td>
<td>117 (31.9)</td>
<td>52 (51.0)</td>
<td>0.02</td>
</tr>
<tr>
<td>Maternal affection and support</td>
<td>7.6 ± 0.1</td>
<td>7.5 ± 0.2</td>
<td>7.8 ± 0.3</td>
<td>0.29</td>
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<tr>
<td>Paternal affection and support</td>
<td>10.3 ± 0.2</td>
<td>11.2 ± 0.4</td>
<td>10.0 ± 0.2</td>
<td>0.003</td>
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</table>

**Psychosocial variables**

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<tr>
<th>Characteristic</th>
<th>All, N= 469</th>
<th>&lt;16 years (N=367)</th>
<th>≥16 years (N=102)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive symptoms</td>
<td>3.0 ± 0.1</td>
<td>2.9 ± 0.1</td>
<td>3.0 ± 0.1</td>
<td>0.61</td>
</tr>
<tr>
<td>Norms about refraining from sex</td>
<td>7.9 ± 0.1</td>
<td>8.0 ± 0.1</td>
<td>7.7 ± 0.2</td>
<td>0.10</td>
</tr>
<tr>
<td>Norms about negative sexual outcomes</td>
<td>3.0 ± 0.0</td>
<td>3.1 ± 0.1</td>
<td>2.6 ± 0.1</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

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*Standard error of the mean*

*b* A composite score representing parental monitoring (higher score represent lack of parental monitoring)

*c* A composite score representing maternal affection and support (higher score represent lack of maternal affection and support)

*d* A composite score representing paternal affection and support (higher score represent lack of paternal affection and support)

*e* A composite score representing depressive symptoms (higher score represent reporting depressive symptoms)

*f* A composite score representing norms about refraining from sex (higher score represent permissive sex norms)

*g* A composite score representing norms about negative sexual outcomes (higher score represent liberal attitude towards negative sexual outcomes e.g. pregnancy)
## TABLE 2 Unadjusted and adjusted estimates of association of individual and family characteristics with early age at first sexual intercourse

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unadjusted (N=469)</th>
<th>Adjusted&lt;sup&gt;c&lt;/sup&gt; (N=469)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR&lt;sup&gt;a&lt;/sup&gt;</td>
<td>95% CI&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Age at time of survey</td>
<td>0.4</td>
<td>0.36-0.53</td>
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<tr>
<td>Female vs. male</td>
<td>0.1</td>
<td>0.04-0.16</td>
</tr>
<tr>
<td>First sexual partner (not a steady boyfriend/girlfriend)</td>
<td>10.1</td>
<td>4.58-22.47</td>
</tr>
<tr>
<td>Goes straight home after school</td>
<td>0.4</td>
<td>0.24-0.75</td>
</tr>
<tr>
<td>Hangs out with classmates</td>
<td>1.1</td>
<td>0.70-1.75</td>
</tr>
<tr>
<td>Hangs out with boyfriends/girlfriends</td>
<td>0.9</td>
<td>0.56-1.45</td>
</tr>
<tr>
<td>Comprehensive high school vs. others</td>
<td>3.6</td>
<td>2.31-5.74</td>
</tr>
<tr>
<td>Parental monitoring</td>
<td>1.1</td>
<td>0.97-1.21</td>
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<tr>
<td>Living with both parents</td>
<td>0.6</td>
<td>0.35-0.93</td>
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<tr>
<td>Maternal affection and support</td>
<td>1.0</td>
<td>0.89-1.04</td>
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<tr>
<td>Paternal affection and support</td>
<td>1.1</td>
<td>1.03-1.17</td>
</tr>
<tr>
<td>Norms about refraining from sex</td>
<td>1.1</td>
<td>0.98-1.26</td>
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<tr>
<td>Attitude towards negative sexual outcomes</td>
<td>2.0</td>
<td>1.45-2.60</td>
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<tr>
<td>Depressive symptoms</td>
<td>1.0</td>
<td>0.84-1.11</td>
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</tbody>
</table>

<sup>a</sup>OR: Odds ratio  <sup>b</sup>CI: Confidence Interval.  <sup>c</sup>Adjusted for all characteristics listed.
### TABLE 3 Final model predicting early sexual intercourse stratified by gender

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall (N=469)</th>
<th>Male (N=102)</th>
<th>Female (N=367)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>OR\textsuperscript{a}</td>
<td>95% CI\textsuperscript{b}</td>
<td>p-value</td>
</tr>
<tr>
<td>Female</td>
<td>0.16</td>
<td>0.07-0.36</td>
<td>&lt;0.0001</td>
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<tr>
<td>Age at time of survey</td>
<td>0.40</td>
<td>0.32-0.52</td>
<td>&lt;0.0001</td>
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<tr>
<td>First sexual partner (not a steady boyfriend/girlfriend)</td>
<td>4.19</td>
<td>1.62-10.84</td>
<td>0.003</td>
</tr>
<tr>
<td>Norms about negative sexual outcomes</td>
<td>1.96</td>
<td>1.34-2.87</td>
<td>0.001</td>
</tr>
<tr>
<td>Model statistics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagelkerke R\textsuperscript{2}</td>
<td>0.48\textsuperscript{*}</td>
<td></td>
<td></td>
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</table>

\textsuperscript{a}OR: Odds ratio. \textsuperscript{b}CI: Confidence Interval. \textsuperscript{*} R\textsuperscript{2} change is based on Nagelkerke’s statistics.
PREVALENCE AND CORRELATES OF DEPRESSIVE SYMPTOMS AMONG HIGH SCHOOL STUDENTS IN HANOVER, JAMAICA

OLANIYI J. EKUNDAYO, JOANA DODSON-STALLWORTH, MICHELE ROOFE, INMACULADA B. ABAN, LAURA H. BACHMANN, JOHN E. EHIRI, MIRJAM C. KEMPF AND PAULINE E. JOLLY

Submitted to The Scientific World Journal – Child Health & Human Development

Format adapted for dissertation
OBJECTIVE: To determine the prevalence of elevated depressive symptoms in Jamaican adolescents and examine its association with individual and family factors.

METHOD: We used an abbreviated form of the Beck’s Depression Inventory II (BDI-II) to assess depressive symptoms among 748 public high school students in the parish of Hanover Jamaica. In the analysis, we classified adolescents with scores in the upper quartile of the depressive symptom score as having depressive symptoms. Multivariate logistic regression was used to determine the predictors of depressive symptoms.

RESULTS: 14.2% of participants reported depressive symptoms. There was a crude association between engagement in sexual activity \[\text{Odds Ratio} \ (\text{OR}) = 1.61, \ 95\% \ \text{Confidence Interval} \ (\text{CI}) = 1.02-2.51\] , parental monitoring of adolescent activity (\text{OR}=2.04, \ 95\%\text{CI}=1.33 -3.12\), maternal affection and support (\text{OR}= 4.07, \ 95\%\text{CI}= 2.62-6.33), and paternal affection and support (\text{OR}= 1.58, \ 95\%\text{CI}= 1.05-2.39) with self reported depressive symptoms. In the final model, depressive symptoms was associated with perceived lack of maternal affection and support (\text{OR}= 4.06, \ 95\%\text{CI}= 2.61-6.32) and marginal association with being sexually experienced (\text{OR}= 1.59, \ 95\%\text{CI}= 1.00-2.52).

CONCLUSION: As most homes are female-headed, establishing support systems for the mother to take care of their adolescent children may decrease the odds of depressive symptoms. Sexually experienced adolescents may require screening for depression.

KEY WORDS: Depressive symptoms; sexual experience; maternal affection and support; high school students; rural Jamaica
Introduction

Adolescent depression is a highly prevalent condition that is often under-recognized by families and physicians alike. Depression may be viewed as normal mood swings typical of the adolescent stage (Saluja, Iachan, Scheidt, Overpeck, Sun, & Giedd, 2004). Research findings indicate that depression may in fact occur more at this age than at any other life stage (Saluja, et al., 2004; Patten, Gillin, Farkas, Gilpin, Berry, & Pierce, 1997; Kubik, Lytle, Birnbaum, Murray, & Perry, 2003). As a result, adolescent depression has become a major public health issue in recent times, with researchers calling for intervention (Patten, et al., 1997; Kubik, et al., 2003). Of concern is the fact that a good proportion of adolescents exhibit depressive symptoms that are sub-threshold for the diagnosis of major depressive disorder (Kubik, et al., 2003).

Current studies from western countries have reported on factors associated with depressive symptoms in adolescents. Risk factors reported include individual variables such as initiation of sexual intercourse (Rector, Johnson, & Noyes, 2003; Kaltiala-Heino, Kosunen, & Rimpela, 2003; Hallfors, Waller, Bauer, Ford, & Halpern, 2005), increasing age (Kubik, et al., 2003; Brooks, Harris, Thrall, & Woods, 2002), and gender (Kubik, et al., 2003; Rector, Johnson, & Noyes, 2003); family factors such as parental low socioeconomic status (Schraedley, Gotlib, & Hayward, 1999; Garrison, Schluchter, Schoenbach, & Kaplan, 1989), family structure (Garrison et al., 1989; Gore, Aseltiner, & Colton, 1992), and lack of parental love and support (Patten, et al., 1997; Schraedley et al., 1999). Other factors include pubertal timing (Ge, Conger, & Elder, 2001; Kaltiala-Heino et al., 2003), poor grades and academic progress in school (Garrison et al., 1989),
trouble with peers (Puskar, Tusaie-Mumford, Sereika, & Lamb, 1999), substance use (Saluja, et al., 2004; Brooks et al., 2002), and other psychosocial measures such as poor self esteem (Overholser, Adams, Lehnert, & Brinkman, 1995).

Studies have shown that engaging in sex places adolescents, especially girls at risk for depression (Rector et al., 2003; Kaltiala-Heino et al., 2003; Hallfors, et al., 2005; Tubman et al., 1996). Adolescent girls engaging in sexual activity has been reported to experience depressive symptoms more than boys with similar behavior (Waller, Hallfors, Halpern, Iritani, Ford, & Guo, 2006). Earlier, Tubman et al (1996) reported that sexually active adolescents displayed more depressive symptoms than their sexually abstinent peers. In their analysis of the National Longitudinal Survey of Adolescent Health, Rector et al (2003) reported that sexually active girls were more than three times more likely to be depressed than girls who were not sexually active. In the same study, boys who were sexually active were twice as likely to be depressed compared to those who were not sexually active (Rector et al., 2003). Furthermore, depressed adolescents are more likely than any other youth to engage in unsafe sexual practices and other risky behaviors (Waller et al., 2006; Shrier, Harris, & Beardslee, 2002; Brooks et al., 2002; Hallfors, et al., 2005; Shrier et al., 2001).

There are no studies designed to identify correlates of depressive symptoms among rural adolescents in Jamaica. Less is also known about the influence of factors such as engagement in sexual activity and parental support on adolescent depression. In this study, we examined the effect of individual and family context variables on depressive symptoms among rural adolescents in Jamaica. We hypothesized, based on
research findings in the literature that depressive symptoms will be positively associated with adolescent sexual experience and lack of parental support.

Methods

Participants

The participants in this survey were part of “The Hanover Teen Study” conducted in the summer of 1998 to identify factors associated with adolescent sexual activity in Jamaica (Stallworth, Roofe, Clark, Ehiri, Mukherjee, Person, & Jolly, 2004). Briefly the study was a cross-sectional survey of high school students attending different types of public high schools in the parish of Hanover, Jamaica, and was designed to identify factors associated with adolescent sexual activity in this parish. The schools selected for participation in this study were comprehensive high schools (formerly new secondary schools (group 1), secondary high, technical and agricultural high school (group 2). Students who perform well in the National Assessment Examination taken at the end of elementary school attend academically rigorous secondary high school and technical high schools which prepare them for college. On the other hand, admission to new secondary schools (now comprehensive high schools) providing a mixture of academic and vocational training is gained from feeder schools and those who did not perform well on the National Assessment Examination with little chance of continuing their education beyond the secondary level (Eggleston, Jackson, & Hardee, 1999). Seven hundred and eighty eight students attending the selected schools participated in the survey.
Procedure

The protocol for this study was reviewed and approved by the institutional review board (IRB) of the University of Alabama at Birmingham and the Ethics Committee, Ministry of Health, Jamaica prior to implementation. Written informed consent from parents and the students were also obtained.

Instruments and Measures

Socio-demographic Variables

Socio-demographic data were collected on variables such as current age at time of survey and gender. We obtained information on adolescents’ sexual experience based on their response to the question “Have you ever had sex: (Yes/No)?” In this study, sex was defined as a penis entering the vagina. Given the sensitive nature of this question and other questions on depression, they were asked towards the end of the survey, after questions about the adolescent’s personal and family characteristics had been answered.

Family Context Variables

Family structure was measured according to whether the adolescent live in intact two-parent family or not. We defined intact family as married biological parents living in the same household with the adolescent.

Parental monitoring and supervision of adolescent activities was measured utilizing three items to determine the extent to which parents know their child’s whereabouts, how much interest they show in who they spend time with, and what the
adolescent does during their free time. An example of this item is “my parents know where I go after school and on weekends”. Response options range from 1 (all the time) to 5 (none of the time). A composite variable based on the sum of these three items was constructed to determine the level of monitoring of adolescents’ activities by the parents. A high score on these scales is considered as lack of parental monitoring/supervision (Cronbach’s alpha = 0.54)

Perception of parental affection and support was measured using a four-item measure (each for the mother and the father). A sample item included the following phrase: “I feel loved by my mother/father.” Response options to these questions range from 1 (all the time) to 4 (none of the time). Adolescents who were not living with their biological parents were asked to substitute “primary female or male guardian” for “mother/father”. Scores were combined separately for each parent to evaluate the level of affection between the adolescent and each of their biological or surrogate parents. High scores indicate lack of maternal affection and support (Cronbach’s alpha = 0.74) and/or lack of paternal affection and support (Cronbach’s alpha = 0.83).

Outcome Variable

The depressive symptom measure consisted of three somatic-affective and psychological symptoms questions (sadness, tiredness, and suicidal thoughts) modified from Beck’s Depression inventory II (BDI II) (Beck, Brown, & Steer, 1996). BDI II measures the severity of self-reported depression in adolescents and adults. Beck et al (1996) factor analyzed the BDI-II responses of 120 undergraduates and identified two
dimensions for self-reported depression symptoms. The first factor was a somatic-affective dimension represented by salient (≥ 35) loadings for somatic symptoms such as tiredness and loss of energy, and affective symptoms such as sadness and crying. The second factor was composed of psychological symptoms, such as suicidal thoughts and worthlessness. Several affective symptoms such as sadness and crying switched between factors (Beck et al., 1996). Items were selected to represent each of the dimensions based on their high loadings on factor analysis and ease of response by adolescents. Respondents were asked to describe themselves in relation to these symptoms in the past two weeks, including the day of the interview. Each symptom is rated on a 4-point scale ranging from 0-3. The maximum score was 9. The internal consistency of the scale for this sample of Jamaican adolescents was 0.79, as measured by Cronbach’s alpha statistics. We defined those who scored in the upper quartile of the distribution of scores as having depressive symptoms (Gadin & Hammarstrom, 2005). This was done to distinguish depressive symptoms from normal mood swings during adolescence. It is possible that adolescents who reported depressive symptoms may have met clinical diagnostic criteria for clinical depression; however, this study did not attempt to link self-reported depressive symptoms with the diagnosis of clinical depression (Patten, et al., 1997).

Sample

The data generated from this study were analyzed for missing responses using the Statistical Package for the Social Sciences (SPSS) frequency procedure. Out of the
original 788 participants, we excluded those with incomplete data (n = 40) on key predictor variables such as gender and engagement in sexual activity from the analysis. For the 748 individuals remaining in the analysis, missing data appeared to be randomly distributed across gender groups. We replaced missing values for continuous variables or for individual items summed to produce composite scores by substituting the mean response given by respondents of the same gender. The range of missingness for continuous explanatory variables for this specific aim was between 0.7% and 3.3%. The largest (3.3%) is attributed to one of the measures of paternal affection and support “I feel loved by my father”.

Statistical Analysis

Frequency distributions were computed for selected socio-demographic characteristics. Mean values and standard errors of the mean (SEM) were calculated for continuous variables. We used Pearson’s chi-square and t-tests to test the associations of these characteristics and depressive symptoms. We then proceeded to perform logistic regressions between the outcome variable and each of the explanatory variables (bivariate) and between the outcome variable with all explanatory variables in the model (multivariate) to estimate crude and adjusted odds ratio (OR) with 95% confidence intervals (CI). We presented the results as unadjusted and adjusted ORs with 95% CI, for the assessment of the stability of the association when all covariates were adjusted for in the model. In the final model, variables were eliminated using stepwise and backward strategy with a 10% cut-off margin.
All tests were two-tailed, and a p-value of 0.05 or less was considered as statistically significant. The Nagelkerke’s $R^2$ statistic which measures how much variation in the dependent variable the model accounts for (Nagelkerke, 1991), was used in this study to assess the strength of the association predicted by the final model. Statistical analysis was conducted using SPSS version 14 (SPSS Inc., Chicago, Illinois).

Results

Table 1 represents the demographic and family characteristics of the sample. Using a cut-off score in the upper quartile of the abbreviated BDI-II, about 1 in 7 participants reported depressive symptoms. The prevalence of depressive symptoms was higher for females than males, 15.7% and 11.4% respectively. The difference however, was not significant. Over 16% of adolescents who reported depressive symptoms were not living in two-parent households compared to 11.5% of adolescents living with both parents. Self-reported depressive symptoms did not increase with age. The proportion of sexually experienced adolescents reporting depressive symptoms was higher than their sexually inexperienced peers (16.2% vs. 10.8%) and the difference was statistically significant ($p=0.04$). Adolescents with depressive symptoms had higher mean scores on the parental monitoring scale ($6.3 \pm 0.2$), compared to those without ($5.6 \pm 0.1$). They had higher mean scores on maternal affection and support scale ($9.4 \pm 0.3$) as well as the paternal affection and support scale ($10.9 \pm 0.4$), compared to those without depressive symptoms ($7.1 \pm 0.1$ and $9.9 \pm 0.1$ respectively). Overall, adolescents with depressive symptoms were more likely to be sexually experienced and to report lack of parental
monitoring and supervision, as well as lack of parental (maternal and paternal) affection and support (p<0.05). The results of the comparison tests for the variables according to the presence or absence of depressive symptoms are presented in Table 1.

The ORs for all socio-demographic variables remained stable, after adjustment for all socio-demographic and family variables. However, the majority of the variables that were significant at the bivariate level lost their statistical significance when they were included with other covariates in multivariate analysis (Table 2). The result of the final predictive model is presented in Table 3. Adolescents who reported depressive symptoms were more likely to be sexually experienced (OR= 1.59, CI= 1.00-2.52) and more likely to report lack of maternal love and support (OR= 4.06, CI= 2.61-6.32). The proportion of variation in elevated depressive symptom explained by the overall model is 0.11.

Discussion

Based on an extensive literature search, we report that this is the first study to examine the correlates of depressive symptoms among adolescents in a rural setting in Jamaica. Our findings indicated that rural Jamaican adolescents exhibit levels of depressive symptoms similar to those reported in the literature for equivalent groups in the Caribbean and elsewhere with over 14% of adolescents in our study sample affected. This is in agreement with findings of Maharajh et al (2005) among Trinidad and Tobago adolescents and adolescents in the United States (Patten, et al., 1997; Kubik, et al., 2003; Brooks et al., 2002) – all reporting the prevalence of depressive symptoms among adolescence to range between 10-35%. More females than males experienced depressive
symptoms (15.7% vs. 11.4%). This difference did not reach formal statistical significance, contrary to what has been reported in most studies (Patten, et al., 1997; Kubik, et al., 2003; Brooks et al., 2002). However, a couple of other studies have reported no significant gender difference in depression between boys and girls (Shek, 1990; Compas, Oppedisano, Connor, Gerhardt, Hinden, Achenbach, & Hammen, 1997). Shek (1990) reported no gender difference in his investigation of the reliability and factor structure of the translated BDI among Chinese adolescents. Compas et al (1997) also reported no gender differences in depressive symptoms between boys and girls among US adolescents in community samples, finding only statistically significant gender differences in those referred for mental health services. The lack of gender difference in our study may also be due to the relatively smaller number of males compared to females in our study sample.

Lack of perceived maternal affection and support was the most significant finding in our study, associated with depressive symptoms. Adolescents who reported lack of maternal affection and support were more likely to exhibit depressive symptoms, compared to their peers who reported enjoying cordial relationships and support from their mother. Interestingly, the majority of Jamaican households are female-headed (United Nations International Children Fund (UNICEF), 2002). Many parents and children living in single parent households face a lot of social and economic challenges (UNICEF, 2002). Living in this type of household likely stresses the adolescent and lack of love and support by the only parent available may aggravate an already stressful situation, leading to emotional distress. Another explanation could be that depressed
adolescents may be less disposed to form supportive relationships with their parents, which could contribute to a perceived lack of parental support. Patten et al (1997) reported that depressed adolescents may be less likely to perceive anyone, including their parents, as supportive.

An important finding was the tendency of association between being sexually experienced and depressive symptoms. When logistic regression was performed with sexual experience as the only variable the association was very strong. The association became only marginally significant when socio-demographic and family variables were adjusted for. This suggests that socio-demographic and other family context variables may play a role in the association between sexual experience and adolescent depression. Two pathways have been postulated for the association between being sexually experienced and depressive symptoms. It is possible that adolescents’ depressive symptoms are occurring in response to sexual activity that took place before they were emotionally ready for it (Kaltiala-Heino et al., 2003). Regretting early sexual activity is commonly reported by adolescents and supports this hypothesis (Wight, Henderson, Raab, Abraham, Buston, Scott, & Hart, 2000). This could be true in the Jamaican environment, where early sexual activity among female adolescents has been reported to be coercive (Kempadoo & Dunn, 2001). The observed association might also suggest that depressed adolescents may engage in sexual activity as a way of dealing with their emotional problems (Brooks et al., 2002), or as an attempt to seek closeness and acceptance from sexual relationships (Kaltiala-Heino et al., 2003). This assumption however, was not supported by the longitudinal study conducted by Hallfors et al (2005),
who reported that stress associated with sexual activity as playing a causal role in the development of adolescent depressive disorders rather than the participation in sexual activity being a reaction to depression.

Several of our measures failed to distinguish between adolescents who reported depressive symptoms and those who did not. Our data suggest that adolescents not living in intact two-parent households tend to have a slightly higher prevalence of depressive symptoms. However, the proportion did not differ significantly from those living in the same household with their biological parents. Similar findings have also been reported in the literature (Patten, et al., 1997). Relationships found in previous studies (Kubik, et al., 2003; Brooks et al., 2002), between increasing age and depression was not obvious in our study. This may be due to the small number of participants below the age of 16 in our study, and the overall moderate sample size. It may also suggest cultural differences in the risk for depression during adolescence. Lack of parental monitoring and lack of paternal affection and support predicted depressive symptoms at the bivariate level but was not predictive in the multivariate analysis. We suggest caution should be exercised in interpreting these non-associations — the findings may be due to insufficient power or small cell samples rather than actual absence of a difference. A larger study with adequate power to detect these differences is suggested.

Limitations, Implications, and Future Directions

There are several limitations to this study that need to be remarked upon. We can not establish a causal link between our findings and depressive symptoms because of the
cross-sectional design of our study. Further studies are needed to examine the temporal relationship between depressive symptoms and associated risk factors in adolescents. Data for this study were obtained through self-report. While efforts were made to ensure anonymity, the sensitive nature of some of the questions could have resulted in inaccurate responses from the participating adolescents. This study is also limited by the fact that both parental affection and support measures and measures of depressive symptoms were provided by the adolescent. Future research that directly interviews the parents is required to further validate these findings. Non-response to some questions and the missing data generated are also limitations. The statistical replacement of missing values by using means minimized the effect of power lost due to listwise deletion, but reduced variability and introduced bias. This study was restricted to high school students in the rural parish of Hanover, Jamaica. We might have underestimated the prevalence of depressive symptoms as depressed adolescents are likely to drop out of school. The generalizability of the present findings to all adolescents in Jamaica may be limited.

To keep this survey at a manageable level and to ensure appropriate response, we used a short form of the BDI-II to assess depressive symptoms in our study. This could raise possible concerns about the validity and reliability of these measures. However, to avoid bias due to normal mood changes in adolescence we dichotomized depressive symptom score at the upper quartile. It is possible that our measure is not a valid assessment of depressive symptomatology in this population. Nevertheless, the response of adolescents to questions on these salient symptoms of depression indicates the need for further research. We suggest that a larger study should be conducted using the full 21-
item BDI-II, or culturally adapted version, to assess depression among Jamaican adolescents.

The strength of this study lies in its being the first epidemiological study of depressive symptomatology among rural Jamaican adolescents. It makes contribution to the literature by simultaneously investigating the contribution of sexual experience and family context variables along with other socio-demographic variables, and allowing for the examination of the relative and independent contributions of these variables to elevated depressive symptoms. Finally, our multivariate model accounted for only 11% of the variations in depressive symptoms in this population, we recognized that we have not controlled for all factors associated with depressive symptoms. The influence of other factors such as age at puberty, illicit drug use, self esteem, religiosity, and other unexamined covariates need to be examined.

In conclusion, our findings support the hypothesis that sexual experience is associated with depressive symptoms only when sexual experience was used as the only explanatory variable for depressive symptoms. There was strong association with lack of maternal affection and support. These findings have implications for prevention of future depression. As most homes are female-headed, establishing support systems for the mother to take care of their adolescent children may decrease the odds of depressive symptoms. Sexually experienced adolescents may require screening for depression. Adolescent health practitioners should consider these factors when designing prevention programs. Depressed adolescents may actually benefit from family and cognitive...
behavior therapy rather than drugs. Finally, we encourage further research to fully explore all factors that could predispose Jamaican adolescents to depression.

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TABLE 1 Individual and family characteristics of participants by depressive symptoms

<table>
<thead>
<tr>
<th>Characteristic, N (%) or mean ± SEM</th>
<th>All N= 748</th>
<th>Depressive symptoms</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes N=106 (14.2)</td>
<td>No N=642 (85.8)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>264 (35.3)</td>
<td>30 (28.3)</td>
<td>234 (36.4)</td>
</tr>
<tr>
<td>Girls</td>
<td>484 (64.7)</td>
<td>76 (71.7)</td>
<td>408 (63.6)</td>
</tr>
<tr>
<td>Age in years at time of survey</td>
<td></td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>10 (1.4)</td>
<td>3 (2.8)</td>
<td>7 (1.1)</td>
</tr>
<tr>
<td>15</td>
<td>189 (25.3)</td>
<td>23 (21.7)</td>
<td>166 (25.9)</td>
</tr>
<tr>
<td>16</td>
<td>302 (40.4)</td>
<td>47 (44.4)</td>
<td>255 (39.7)</td>
</tr>
<tr>
<td>17</td>
<td>128 (17.1)</td>
<td>16 (15.1)</td>
<td>112 (17.4)</td>
</tr>
<tr>
<td>18</td>
<td>68 (9.1)</td>
<td>7 (6.6)</td>
<td>61 (9.5)</td>
</tr>
<tr>
<td>19</td>
<td>51 (6.8)</td>
<td>10 (9.4)</td>
<td>41 (6.4)</td>
</tr>
<tr>
<td>Sexually experience</td>
<td></td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>469 (62.7)</td>
<td>76 (71.7)</td>
<td>393 (61.2)</td>
</tr>
<tr>
<td>No</td>
<td>279 (37.3)</td>
<td>30 (28.3)</td>
<td>249 (38.8)</td>
</tr>
<tr>
<td>Family structure</td>
<td></td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Living with both biological parents</td>
<td>312 (41.7)</td>
<td>36 (34.0)</td>
<td>276 (43.0)</td>
</tr>
<tr>
<td>Not living with both biological parents</td>
<td>436 (58.3)</td>
<td>70 (66.0)</td>
<td>366 (57.0)</td>
</tr>
<tr>
<td>Parental monitoring(^b)</td>
<td>5.7 ± 0.1</td>
<td>6.3 ± 0.2</td>
<td>5.6 ± 0.1</td>
</tr>
<tr>
<td>Maternal affection and support(^c)</td>
<td>7.4 ± 0.1</td>
<td>9.4 ± 0.3</td>
<td>7.1 ± 0.1</td>
</tr>
<tr>
<td>Paternal affection and support(^d)</td>
<td>10.0 ± 0.1</td>
<td>10.9 ± 0.4</td>
<td>9.9 ± 0.1</td>
</tr>
</tbody>
</table>

\(^a\)Standard error of the mean

\(^b\)A composite score representing parental monitoring (higher score represent lack of parental monitoring)

\(^c\)A composite score representing maternal affection and support (higher score represent lack of maternal affection and support)

\(^d\)A composite score representing paternal affection and support (higher score represent lack of paternal affection and support)
TABLE 2 Unadjusted and adjusted estimates of association of individual and family characteristics of participants with depressive symptoms

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unadjusted (N=748)</th>
<th></th>
<th></th>
<th>Adjusted(^c) (N=748)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR(^a)</td>
<td>95% CI(^b)</td>
<td>p-value</td>
<td>OR</td>
<td>95% CI</td>
<td>p-value</td>
</tr>
<tr>
<td>Age in years at time of survey</td>
<td>1.0</td>
<td>0.85-1.21</td>
<td>0.60</td>
<td>0.9</td>
<td>0.77-1.11</td>
<td>0.42</td>
</tr>
<tr>
<td>Female</td>
<td>1.5</td>
<td>0.92-2.28</td>
<td>0.10</td>
<td>1.4</td>
<td>0.86-2.31</td>
<td>0.18</td>
</tr>
<tr>
<td>Sexual experience</td>
<td>1.6</td>
<td>1.02-2.51</td>
<td>0.04</td>
<td>1.6</td>
<td>0.99-2.68</td>
<td>0.06</td>
</tr>
<tr>
<td>Living with both biological parents</td>
<td>0.7</td>
<td>0.44-1.05</td>
<td>0.08</td>
<td>0.8</td>
<td>0.53-1.32</td>
<td>0.44</td>
</tr>
<tr>
<td>Parental monitoring</td>
<td>2.0</td>
<td>1.33-3.12</td>
<td>&lt;0.0001</td>
<td>1.4</td>
<td>0.91-2.30</td>
<td>0.12</td>
</tr>
<tr>
<td>Maternal affection and support</td>
<td>4.1</td>
<td>2.62-6.33</td>
<td>&lt;0.0001</td>
<td>3.5</td>
<td>2.16-5.70</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Paternal affection and support</td>
<td>1.6</td>
<td>1.05-1.14</td>
<td>0.03</td>
<td>1.0</td>
<td>0.61-1.50</td>
<td>0.84</td>
</tr>
</tbody>
</table>

\(^a\)OR: Odds ratio \(^b\)CI: Confidence Interval. \(^c\)Adjusted for all characteristics listed.
**TABLE 3** Final model predicting depressive symptoms

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OR&lt;sup&gt;a&lt;/sup&gt;</th>
<th>95% CI&lt;sup&gt;b&lt;/sup&gt;</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexually experienced</td>
<td>1.59</td>
<td>1.00-2.52</td>
<td>0.05</td>
</tr>
<tr>
<td>Lack of maternal affection and support</td>
<td>4.06</td>
<td>2.61-6.32</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Model statistic
Nagelkerke $R^2$ 0.11

<sup>a</sup>OR: Odd ratio. <sup>b</sup>CI: Confidence Interval.
SUMMARY AND CONCLUSIONS

In this study, we reported differences in individual and family characteristics of sexually experienced adolescents attending high schools in the parish of Hanover, Jamaica, compared to their sexually abstinent peers. We found that more boys (80%) than girls (53%) were sexually experienced ($p<0.0001$). There were gender differences in predictors of initiation of sexual intercourse, with more variables predicting initiation of sexual intercourse for girls than for boys. We reported family factors (family structure and parental monitoring) as significant predictors of initiation of sexual activity, especially for adolescent girls.

Similarly, there were gender differences in the predictors of sexual debut before the age of 16 ($p<0.0001$). Girls who engaged in sexual activities early were more likely to have been initiated by partners other than steady boyfriends, suggesting that early sexual relations for girls could be coercive. Girls who were early starters were also more likely to be older at time of survey and to have permissive norms about negative sexual outcomes. Boys on the other hand were mainly influenced by permissive attitude condoning negative sexual outcomes.

Our finding support the hypothesis that sexual experience is associated with depressive symptoms when sexual experience was used as the only explanatory variable for depressive symptoms. Sexually experienced adolescents were 60% more likely to experience depressive symptoms compared to their sexually abstinent peers ($p=0.04$). The association was only marginally significant when other covariates were adjusted for
Adolescents who reported lack of maternal affection and support were four times more likely to experience elevated depressive symptoms (p<0.0001).

In conclusion, our findings indicate that sexual activity during adolescence is common among rural Jamaican adolescents, with similarities in proportion and predictors to what has been reported among comparable populations in the United States. These findings have implications for the prevention of adolescent pregnancy and STIs. Intervention programs must recognize the gender differences and implement a broad-range prevention strategy that can adequately address the social and cognitive needs of both sexes. Of concern is the finding that girls were initiated by partners other than steady boyfriends. The extent to which these represent incestuous and/or coercive sexual relations warrants further investigation.

Our results also make an important contribution to the understanding of depressive symptoms among adolescents in a rural setting in Jamaica with the need for further research. As most homes are female-headed, establishing support systems for the mother to take care of their adolescent children may decrease the odds of depressive symptoms. Adolescent health practitioners may consider screening sexually experienced adolescents for depression when designing programs to prevent and treat adolescent depression.


APPENDIX A

PREVIOUS STUDIES
<table>
<thead>
<tr>
<th>Author, year, country</th>
<th>Study design, sample size</th>
<th>Findings</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meschke et al., 1997, Germany</td>
<td>Cross-sectional 702 (15-18 year olds, 233 girls and 347 boys)</td>
<td>Higher levels of parental monitoring predicted later initiation of sexual intercourse. Pubertal timing, risky and social-romantic leisure associated with early sexual experience.</td>
<td>Investigated the effects of pubertal timing, demographics, family process, and leisure activities on sexual experience.</td>
</tr>
<tr>
<td>Spencer et al., 2001, USA</td>
<td>Prospective 188 virgins (12-14 years old at Time 1, 14-16 at Time 2, 107 girls and 81 boys)</td>
<td>Boys with higher self esteem were more likely to initiate intercourse at Time 2. Girls with high self esteem were more likely to remain virgins.</td>
<td>Pubertal status was unrelated to initiation of coitus.</td>
</tr>
<tr>
<td>Valle et al., 2005, Norway</td>
<td>Cross-sectional 3,469 (14-17 year olds, 1741 girls and 1724 boys)</td>
<td>High scores of parental monitoring, future aspirations, academic self concept, and low scores of depressed mood was protective against early sexual debut.</td>
<td>Early sexual debut varies according to social class and gender.</td>
</tr>
<tr>
<td>Santelli et al., 2004, USA</td>
<td>Prospective 3,163 (7th and 8th grade students, 52% girls and 48% boys)</td>
<td>Personal and perceived peer norms about refraining from sex protective against sexual initiation. Alcohol, male gender, black race, and poor academic performance were consistent risk factors.</td>
<td>Self-efficacy showed a mixed effect. Protective in the seventh grade but increased risk in the eighth grade.</td>
</tr>
<tr>
<td>Paul et al., 2000, New Zealand</td>
<td>Prospective birth cohort 935 (458 girls, 477 boys)</td>
<td>27.5% of males and 31.7% of females reported sexual intercourse before age 16. Predictors of early initiation for males include: no religious activity, not attached to school, and conduct disorder. For girls, independent predictors include socioeconomic status, mother’s early child bearing, trouble in school, cigarette smoking, and high self esteem.</td>
<td>More females than males initiate sexual intercourse before age 16. Individual and school factors appear to be more important than family composition or socio-economic status.</td>
</tr>
<tr>
<td>Author, year, country</td>
<td>Study design, sample size</td>
<td>Findings</td>
<td>Comment</td>
</tr>
<tr>
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<td>----------------------------------------------</td>
</tr>
<tr>
<td>Robinson et al., 1999, USA</td>
<td>Cross-sectional 613 (sixth grade students, 50% girls and 50% boys)</td>
<td>For boys predictors of sexual initiation include perception of other boys having sex, having a serious girlfriend, and smoking status. Girls are influenced by smoking status and having a serious boyfriend.</td>
<td>Efficacy expectation consistently predicted sexual initiation for gender and race categories.</td>
</tr>
<tr>
<td>Mott et al., 1996, USA</td>
<td>Prospective birth cohort 451 (219 Girls and 232 boys)</td>
<td>Adolescents whose mothers had sex at early age are more likely to become sexually active before age 14. Black race and use of controlled substances associated with sexual intercourse before age 14.</td>
<td>Church attendance important only if child’s friend attend the same church.</td>
</tr>
<tr>
<td>Upchurch et al., 1998, USA</td>
<td>Prospective 877 (12-17 year olds, 50% boys and 50% girls)</td>
<td>Black males had rates of first sex 3-5 times that of other gender and ethnicity groups. White and black females reported similar ages, while Asian American and Hispanic females have rates half that of white females. Protective effects explained by differences in family structure.</td>
<td>Socio-economic conditions account for ethnic differences among females. Explanation for black males remains elusive.</td>
</tr>
<tr>
<td>Rosenthal et al., 1999, Australia</td>
<td>Prospective 241 (grades 10-12 students, 147 girls and 94 boys )</td>
<td>Perception of greater physical maturity, use of illicit drug, and expectation of earlier autonomy associated with early sexual initiation.</td>
<td>No association between gender and age at first experience of intercourse.</td>
</tr>
<tr>
<td>Author, year, country</td>
<td>Study design, sample size</td>
<td>Findings</td>
<td>Comment</td>
</tr>
<tr>
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</tr>
<tr>
<td>Davis et al., 2001, USA</td>
<td>Prospective 12,367 (11-18 year olds, 6,261 girls and 6,106 boys)</td>
<td>Mother-child relationship, level of interaction, and mother’s attitude towards and discussion of sex is associated with adolescent sexual debut.</td>
<td>With the exception of girls in single-parent families, family structure does not significantly influence adolescents’ sexual initiation.</td>
</tr>
<tr>
<td>Sieverding et al., 2005, USA</td>
<td>Prospective 307 (virginal youth, 43.3% girls and 57.7% boys)</td>
<td>Adolescents who reported successful parental monitoring expressed less sexual intention.</td>
<td>Adolescents reporting more unrestricted time were more likely to express cognitions that favored initiating intercourse.</td>
</tr>
<tr>
<td>Santelli et al., 2000, USA</td>
<td>Cross-sectional 3,904 (14-17 year olds, 1,951 girls and 1,953 boys)</td>
<td>Greater parental education, living in a two-parent family, and white race were independently associated with never initiating sexual intercourse.</td>
<td>Adjustment for socioeconomic status and family structure had a limited effect on the association between race/ethnicity and sexual behavior.</td>
</tr>
<tr>
<td>Velez-Pastrana et al., 2005, Puerto Rico, USA</td>
<td>Cross-sectional 425 (12-16 year olds, 270 girls and 155 boys)</td>
<td>Significant relationships were observed between early onset of sexual intercourse and parental supervision, parental support, and parents’ marital status.</td>
<td>Youths who postponed sexual activity have greater support, supervision, and parental involvement.</td>
</tr>
<tr>
<td>Author, year, country</td>
<td>Study design, sample size</td>
<td>Findings</td>
<td>Comment</td>
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<tr>
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</tr>
<tr>
<td>Tubman et al., 1996, USA</td>
<td>Prospective 1,167 (high school sophomores and juniors, 51% girls and 49% boys)</td>
<td>Higher levels of depressive symptoms were reported by female adolescents and those who were sexually active. Average CES-D scores for female intercourse groups twice those for male groups</td>
<td>Adolescents characterized by earlier onset of and more persistent patterns of sexual behavior reported more depressive symptoms.</td>
</tr>
<tr>
<td>Kaltiala-Heino et al., 2003, Finland</td>
<td>Cross-sectional 33,004 (14-16 year olds, 17,082 girls and 15,922 boys)</td>
<td>Among girls self-reported depression was associated with early puberty and intimate sexual relationship. For boys early and late puberty and experience of intercourse was associated with depression.</td>
<td>It is possible that adolescents react with depression to sexual activity. Depressed adolescents may engage in sexual activity as a form of self-medication.</td>
</tr>
<tr>
<td>Hallfors et al., 2005, USA</td>
<td>Prospective 13,568 (7th to 11th grade at Wave 1, 8th to 12th grade at Wave 2, 6,962 girls and 6,606 boys)</td>
<td>Engaging in sex and drug behaviors places adolescents, especially girls, at risk for future depression.</td>
<td>Findings do not support the theory that youth initiate sex and drug behaviors to “self-medicate” depression.</td>
</tr>
<tr>
<td>Waller et al., 2006, USA</td>
<td>Cross-sectional (Wave 1 prospective) 18,799 (9,580 girls and 9,219 boys)</td>
<td>Girls engaging in low and moderate substance use and sexual activity experience more depressive symptoms than boys with similar behavior.</td>
<td>Screening for depression is indicated for female adolescents engaging in even experimental risk behaviors.</td>
</tr>
<tr>
<td>Author, year, country</td>
<td>Study design, sample size</td>
<td>Findings</td>
<td>Comments</td>
</tr>
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<td>--------------------------</td>
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<tr>
<td>Wyatt et al., 1999, Jamaica</td>
<td>Cross-sectional 897 (women, 15-50 years old)</td>
<td>Family structure in childhood, early age at menarche, lower socio-economic status, and involvement in casual relationship were associated with initiation of sexual activity before the age of 16.</td>
<td>A major limitation of this study is the reliance on retrospective account of sexual initiation.</td>
</tr>
<tr>
<td>Jackson et al., 1998, Jamaica</td>
<td>Prospective 945 (7th grade students, 490 girls and 455 boys)</td>
<td>Adolescents who had experimented with alcohol were more likely than others to say they had experienced sexual intercourse</td>
<td>Age, who adolescents lived with, and church attendance were not associated with reporting sexual experience</td>
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</tbody>
</table>
APPENDIX B

POPULATION OF JAMAICA BY PARISH (1991-2001)

<table>
<thead>
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Adapted from the Jamaican Sustainable Development Network
*Parish over 70% rural.
APPENDIX C

THE STRUCTURE OF EDUCATION IN JAMAICA
### The Structure of Education in Jamaica

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<th>11</th>
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<td></td>
<td>Primary Schools</td>
<td>All Age Schools</td>
<td>Primary and Junior High (P&amp;JH)</td>
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<td>New Secondary (pre-vocational)</td>
<td>Comprehensive (mixed academic and vocational)</td>
<td>Secondary High (academic)</td>
<td>Technical High (mixed academic) &amp; Technical</td>
<td>Vocational and Agricultural High</td>
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<td>Early Childhood</td>
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<td>Common Entrance Exam</td>
<td>Examination (CEB)</td>
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<tr>
<td>Junior Schools</td>
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<td></td>
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<tr>
<td>Nursery/Kindergarten</td>
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**Source:** Government of Jamaica, Ministry of Education
APPENDIX D

DATABASE INFORMATION
TABLE 1 Number of participants with missing values on outcome and predictor variables by gender

<table>
<thead>
<tr>
<th></th>
<th>Overall N=748</th>
<th>Males N=264</th>
<th>Females N=484</th>
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<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
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<tr>
<td>Gender</td>
<td>7 (0.8)</td>
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<td>Outcome variables</td>
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<tr>
<td>Paper 1</td>
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<tr>
<td>Ever had sex (Yes/No)</td>
<td>33 (4.4)</td>
<td>20 (9.6)</td>
<td>13 (1.0)</td>
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<tr>
<td>Paper 3</td>
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<tr>
<td>Feels sad</td>
<td>12 (1.6)</td>
<td>9 (3.4)</td>
<td>3 (0.6)</td>
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<tr>
<td>Feels tired</td>
<td>8 (1.1)</td>
<td>3 (1.1)</td>
<td>5 (1.0)</td>
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<tr>
<td>Suicidal thoughts</td>
<td>10 (1.3)</td>
<td>5 (1.9)</td>
<td>5 (1.0)</td>
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<tr>
<td>Predictor (continuous) variables</td>
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<tr>
<td>Age at time of survey</td>
<td>16 (2.1)</td>
<td>6 (2.3)</td>
<td>10 (2.1)</td>
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<tr>
<td>Parental monitoring</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Meet adult at home after school</td>
<td>13 (1.7)</td>
<td>9 (3.4)</td>
<td>4 (0.8)</td>
</tr>
<tr>
<td>Parents know adolescents’ whereabouts</td>
<td>10 (1.3)</td>
<td>4 (1.5)</td>
<td>6 (1.2)</td>
</tr>
<tr>
<td>Parents know adolescents’ friends</td>
<td>9 (1.2)</td>
<td>5 (1.9)</td>
<td>4 (0.8)</td>
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<tr>
<td>Maternal affection and support</td>
<td></td>
<td></td>
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<tr>
<td>Loved by mother</td>
<td>7 (0.9)</td>
<td>3 (1.1)</td>
<td>4 (0.8)</td>
</tr>
<tr>
<td>Get attention from mother</td>
<td>7 (0.9)</td>
<td>3 (1.1)</td>
<td>4 (0.8)</td>
</tr>
<tr>
<td>Share hugs with mother</td>
<td>17 (2.3)</td>
<td>10 (3.8)</td>
<td>7 (1.4)</td>
</tr>
<tr>
<td>Discuss personal problems with mother</td>
<td>15 (2.0)</td>
<td>8 (3.0)</td>
<td>7 (1.4)</td>
</tr>
<tr>
<td>Paternal affection and support</td>
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</tr>
<tr>
<td>Loved by father</td>
<td>25 (3.3)</td>
<td>13 (4.9)</td>
<td>12 (2.5)</td>
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<tr>
<td>Get attention from father</td>
<td>17 (2.3)</td>
<td>6 (2.3)</td>
<td>11 (2.3)</td>
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<tr>
<td>Share hugs with father</td>
<td>18 (2.4)</td>
<td>5 (1.9)</td>
<td>13 (2.7)</td>
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<td>Discuss personal problems with father</td>
<td>20 (2.7)</td>
<td>6 (2.3)</td>
<td>14 (2.9)</td>
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<td>Norms about refraining from sex</td>
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<tr>
<td>Sex should wait till older than 18 years</td>
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<td>4 (1.5)</td>
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<td>Teenagers should stay away from sex</td>
<td>6 (0.8)</td>
<td>4 (1.5)</td>
<td>2 (0.4)</td>
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<tr>
<td>Sex is for big people</td>
<td>12 (1.6)</td>
<td>7 (2.7)</td>
<td>5 (1.0)</td>
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<tr>
<td>Sex can get in the way of future goals</td>
<td>11 (1.5)</td>
<td>6 (2.3)</td>
<td>5 (1.0)</td>
</tr>
<tr>
<td>Sex should wait till after school</td>
<td>6 (0.8)</td>
<td>4 (1.5)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Norms about negative sexual outcomes</td>
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<tr>
<td>Getting pregnant in school is no big deal</td>
<td>19 (2.5)</td>
<td>10 (3.8)</td>
<td>9 (1.9)</td>
</tr>
<tr>
<td>Feel bad if pregnant or cause pregnancy</td>
<td>14 (1.9)</td>
<td>9 (3.4)</td>
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</tr>
</tbody>
</table>

NB: Out of the original sample of 788, those with missing values on gender (N=7) and coital status (N=33) were excluded leaving 748 participants for analysis.
APPENDIX E

INSTITUTIONAL REVIEW BOARD APPROVAL FORM
Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56 and ICH GCP Guidelines. The Assurance became effective on November 24, 2003 and expires on February 14, 2009. The Assurance number is FWA00065960.

Principal Investigator: EKUNDAYO, OLANIYI JAMES
Co-Investigator(s):    
Protocol Number: E060915003
Protocol Title: Factors Associated with Sexual Debut and Depression Among Adolescents in Rural Jamaica

The above project was reviewed on 10/16/06. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This project qualifies as an exemption as defined in 45CFR46.101, paragraph 4.

This project received EXEMPT review.

Date IRB Approval issued: 10/16/06

Sheila Moore, CIP
Director, Office of the Institutional Review Board for Human Use (IRB)

Investigators please note:

IRB approval is given for one year unless otherwise noted. For projects subject to annual review, research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.