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EARLY SEXUAL INITIATION: EXAMINING THE INFLUENCE OF INDIVIDUAL BEHAVIOR, PARENTS, PEERS, AND SCHOOLS

By

Lauren F. Lichty

A DISSERTATION

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ABSTRACT

EARLY SEXUAL INITIATION: EXAMINING THE INFLUENCE OF PARENTS, PEERS, AND SCHOOLS

By

Lauren F. Lichty

According to national estimates, approximately one in five adolescents will debut sexually by age 15. Early sexual initiation has been associated with several negative sexual health outcomes such as STIs and unwanted pregnancy. Researchers need to identify protective and risk factors associated with early sexual initiation in order to develop prevention efforts that will result in delayed sexual debut. The extant literature highlights the importance of the social context for understanding adolescent sexual behavior. However, much of this research has been limited by cross-sectional designs, samples spanning developmentally distinct ages, over-reliance on univariate analysis, and a lack of multisystemic, ecologically-oriented frameworks. Taken together, these limitations result in prior research painting an unfinished portrait of early sexual initiation.

In this sample of 378 participants, approximately one-quarter of adolescents debuted sexually between ninth and tenth grade. An additional 136 students initiated sexual activity prior to baseline data collection. Collectively, 42% of high school students in this sample debuted early. This high rate of early sexual initiation underscores the importance of attending to this social issue.

A social contextual model of early sexual initiation was assessed using longitudinal data collected from a school-based sample of youth. Sexual initiation between ages 14 and 15 years was predicted from parental connectedness, deviant peers, school connectedness, and individual problem behavior variables. Path analysis was employed to test direct and indirect effects. This allowed for the detection of more complex, mechanistic relationships among key social contextual influences on adolescent behavior. The model was only partly upheld. Deviant peer associations and problem behaviors were directly related to early sexual initiation; having more deviant friends and engaging in more problem behaviors in grade nine increased the likelihood of sexual initiation by grade ten. Neither parental connectedness nor school connectedness were directly related to early sexual debut. However, both connectedness variables indirectly affected early sexual initiation. Positive connections to parents appear to be protective against early sexual initiation via their effect on peer associations, while school connectedness was indirectly related to early sexual initiation through problem behaviors.

These results highlight the powerful role peers and past individual behavior play in directly shaping future sexual activity. Connections to parents and the school setting indirectly promote delayed sexual initiation; when strong, positive connections exist, adolescents are less susceptible to deviant peer groups, other problem behaviors, and, ultimately, early sexual initiation. As such, intervention and prevention efforts that foster parental and school connectedness may lead to decreased early sexual initiation rates. The findings from this study reinforce the need for additional prospective, ecologicallyoriented research that employs sophisticated analytic techniques such as structural equation modeling. For my family, those still here and those remembered.

With admiration, appreciation, and love.

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INTRODUCTION

Sexuality is a core component of human development and individual health (World Health Organization, 2004). Sexual development begins at birth and continues over the course of one's lifetime (Hyde & DeLamater, 2000). As defined by international experts associated with the World Health Organization (WHO), sexual health is

"A state of physical, emotional, mental, and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships... Sexuality is influenced by the interaction of biological, psychological, social, economic, political, cultural, ethical, legal, historical, religious, and spiritual factors (p.3, 2004)."

This definition highlights the complexity of sexuality and sexual health; healthy sexual development is not purely an individual-level process, but instead is embedded in social context.

Fundamental shifts in sexual development and behavior occur with the onset of puberty and adolescence (Hyde & DeLamater, 2000), making adolescence a time warranting targeted attention by health researchers and practitioners. Mid to late adolescence has emerged in recent decades as the normative time at which individuals become sexually active. National studies have found that the majority of adolescents (approximately 65-67%) are engaging in sexual intercourse by age 19 (Abma, Martinez, Mosher, & Dawson, 2004; Center for Disease Control and Prevention (CDC), 2008). A review of longitudinal research on adolescent sexual behavior found that 70-90% of adolescents reported having first sexual intercourse by age 18 (Zimmer-Gembeck & Helfand, 2008). However, a minority of youth become sexually active at much younger ages. For example, one national study found that approximately 7% of adolescents reported having sexual intercourse for the first time before they were 13 (CDC, 2008). Another nationally representative sample of 12 to 14 year olds found that nearly one in five youth (19%) had initiated sexual activity prior to age 15 (Terry-Humen & Manlove, 2003). Similarly, Bruckner and Bearman (2003) reported that 18% of the nationally representative sample of adolescents surveyed in the National Longitudinal Study of Adolescent Health (Add Health) was sexually active before age 15. These findings suggest that a noteworthy proportion of adolescents are engaging in early sexual initiation.

Early Sexual Debut as a Social Problem

Early initiation of sexual intercourse has significant effects on sexual health. Early sexual initiation has been associated in longitudinal and cross sectional research with an increased likelihood of unwanted pregnancy, multiple sexual partners, and sex while using drugs or alcohol (Kotchick, Shaffer, Forehand, & Miller, 2001; O'Donnell, O'Donnell, & Stueve, 2001). In a nationally representative sample of females aged 15 to 19 years, among participants who initiated sex prior to age 15, 25% had seven or more sexual partners, compared to only 7% among those whose first sex occurred between ages 17 through 19 (Abma et al., 2004). The same study found that 35% of sexually active adolescents under age 15 used no method of contraception at first intercourse, compared to 24% of sexually active 15 to 16 year olds and 17% of sexually active 17 to 19 year olds. In a review of longitudinal research, Zimmer-Gembeck and Helfand (2008) found that youth who become sexually active in middle adolescence (age 16-18) are more consistent condom and other contraceptive users compared to youth who become sexually active earlier (age 15 or younger).

In addition to unwanted pregnancy, such risky sexual behaviors contribute to the growing problem of sexually transmitted infections (STI) and human immunodeficiency virus (HIV) infections among adolescents. It was estimated that nearly 50% of all STI cases (approximately 9 million out of 19 million cases) in the year 2000 were among youth aged 15 to 24 years (Weinstock, Berman, & Cates Jr., 2004). When analyzing the Add Health data for 9,844 persons aged 18 to 26 years, Kaestle and colleagues (2005) found that sexual debut between ages 13 to 15 years was associated with more than double the odds of having an STI by age 18 compared to adolescents who debuted at age 17, suggesting that delaying intercourse is protective against contraction of STIs in adolescence. Taken collectively, these findings paint a troubling portrait of the sexual health of individuals who initiate sexual activity in early adolescence, suggesting worse outcomes for those who debut early relative to those who delay intercourse.

In addition to observations of different outcomes for those who debut early, empirical research has begun to lend support for distinct pathways (i.e., series of factors that predict an outcome) to sexual debut. In the first review of its kind, Zimmer-Gembeck and Helfand (2008) examined the longitudinal research on adolescent sexual behavior from 1995 to 2004. The authors sought to isolate whether the literature supports the presence of different sexual debut pathways. After organizing studies by the age of participants, Zimmer-Gembeck and Helfand found evidence of three pathways to sexual initiation notably differentiated by the age of debut. The first pathway resulted in a nonnormative age of debut, defined as occurring at age 15 or younger. The second pathway resulted in a normative age of debut, occurring between age 16 and 18. Finally, a third pathway emerged, with delayed debut occurring after age 18.

Alcohol use, delinquency, school problems, and depressive symptoms (for girls only) were the primary variables that uniquely predicted sexual initiation prior to age 16 (the early pathway). In addition, youth who delayed sexual initiation until between age 16 and 18 (the middle pathway) were more likely to have stronger connections to school and more positive relationships with peers compared to those who initiated early. Youth who debuted in early and middle adolescence had more friends who used substances and held more permissive attitudes toward sexual behavior. In addition, these youth were more likely than those who debuted late to report greater physically maturity, hold more permissive sexual attitudes, receive less parental monitoring, and reside outside of a twobiological parent household. Youth who debuted late expressed religious and familybased values that explicitly disapproved of sexual activity as well as friends committed to abstinence. Finally, boys who delayed sexual initiation until after age 18 had greater anxiety compared to boys who did not delay initiation. Zimmer-Gembeck and Helfand's findings that several variables were uniquely predictive of early sexual initiation support the need for direct research examining the early pathway to sexual initiation.

The body of work on adolescent sexual behavior suggests that there is something unique about early sexual initiation, and that early sexual initiation is maladaptive. To prevent the early sexual debut of adolescents, we need to understand what differentiates the developmental trajectory of youth who debut early from those who do not. What factors promote delayed sexual debut? What factors place young people at risk for engaging in early sexual activity? What factors buffer against such risks? Answers to these questions can provide direction to prevention and sexual health promotion efforts. Across studies and decades, researchers agree that adolescent sexual behavior is complex, emerging as a result of both individual and environmental influences. For example, in a review of over 250 peer-reviewed publications with data collected in 1975 or later from samples of 100 or more adolescents residing in the United States who were 19 years of age or younger, Kirby (2002a) identified more than 100 antecedents to sexual initiation spanning the individual, peer group, family, school, community, and state policy. This paper reflects the most extensive catalogue of significant predictors of early sexual initiation, with all significant findings documented, even if they were only found significant in a single study. While Kirby did not isolate the relative strength of each predictor, his findings illustrate the complexity of this behavior.

Two key themes emerged from Kirby's (2002a) literature review: 1) social environments (family, peers, schools) strongly influence adolescents' sexual behavior by sharing and socializing youth to adopt specific beliefs or norms (typically either prosexual or pro-abstinence), modeling behaviors, providing opportunities to engage in negative/pro-social behaviors, and by applying social pressure to adopt (or not adopt) negative behaviors and 2) sexual risk taking reduces as attachment to people or groups who express protective values and model positive behaviors increases. The collection of findings presented by Kirby highlight the need for attending to the social context of adolescent development in order to understand sexual initiation.

Across studies and literature reviews, it is evident that both the individual and environment matter (Buhi & Goodson, 2007; Goodson, Evans, & Edmundson, 1997; Kirby, 2002a; Kotchick et al., 2001; Miller, Benson, & Galbraith, 2001; Smith, Guthrie, & Oakley, 2005; Zimmer-Gembeck & Helfand, 2008). The specific variables examined

pertaining to the individual, family, peer, and school contexts have varied across studies, with varying consistency of findings; however, there is consensus that these contexts are essential to understanding the pathway to early sexual debut. The current study seeks to contribute to our understanding of early sexual initiation by building on the previous research literature, with an emphasis on the developmentally central family, peer, and school microsystems. The literature review that follows will examine these constructs and their connections to early sexual debut in greater depth.

LITERATURE REVIEW

Research on adolescent sexual behavior has been extensive over the past several decades. In an effort to condense this expansive literature, several literature reviews have been published, seven of which offer useful insights into early sexual debut (Buhi & Goodson, 2007; Goodson et al., 1997; Kirby, 2002a; Kotchick et al., 2001; Miller et al., 2001; Smith et al., 2005; Zimmer-Gembeck & Helfand, 2008). These literature reviews capture findings relevant to early sexual initiation published from 1965 through 2005. The published literature reviews will be drawn upon throughout this literature review. Details on the method and findings of each review will be presented throughout the subsequent sections. In each section that follows, the research and theories relevant to each construct to be examined in the proposed study will be presented. Specifically, the developmental justification for examining each construct as well as the findings regarding the relationship between early sexual initiation and each construct will be reviewed. Next, a review of several methodological flaws in the extant literature will be examined. Finally, the conceptual model for this study will be presented along with the relevant hypotheses and a summary of the proposed study.

Parental Connectedness

Parental Connectedness and Development. Parents serve as the primary socializing agents during childhood and early adolescent development, responsible for guiding youth as they acquire values, attitudes, and social and decision-making skills employed across the life span. In their examinations of parenting and the parent-child relationship, Dishion and McMahon (1998) described a dynamic, interrelated triad of

parenting practices embedded within the context of the parent-child relationship. The triad consists of monitoring (e.g., attention, tracking, and structuring contexts), behavior management (e.g., problem-solving, limit-setting, positive reinforcement), and parent's belief system (e.g., values, goals, and norms). The foundation of this triad is the quality of the parent–child relationship (e.g., consisting of trust, security, and involvement). The authors contend (with empirical support) that relationship quality is "critical to children's well-being and social development (p. 64)" and emphasize its dynamic interrelationship with the other dimensions of parenting. Work by Metzler and colleagues (1994) involving three separate samples found a significant inverse relationship between parental involvement and poor monitoring and coercive parent-child interactions. These findings lend further support for Dishion and McMahon's model of parenting, such that a positive underlying relationship quality, the current study will focus on a construct that is consistent with this conceptualization of parenting, parental connectedness.

Parental connectedness, also referred to in the literature as parental support or parental involvement, is a broad construct that reflects a supportive relationship, consisting of regular involvement, positive interactions, and feelings of love and acceptance. It can be thought of as a component of authoritative parenting style (Baumrind, 1991) and is indicative of a high quality parent-child relationship. In this section of the literature review, I will briefly present research that provides the foundation for parental connectedness as important to development. I will then review the literature specific to the relationship between parental connectedness and early sexual initiation. Studies often examine sub-domains of parental connectedness; therefore, the literature

reviewed in this section includes studies that focus on elements of parental connectedness as well as the broader construct.

Gray and Steinberg (1999) found that parental involvement was associated with positive psychosocial development as well as the avoidance of negative adolescent behaviors such as risk taking. Empirically supported social attachment theories (e.g., problem behavior theory, social control theory) posit that young people with more positive connections to their parents are more likely to internalize the familial values and behavioral expectations (Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Hirschi, 2002; Jessor, 1987; L'Engle & Jackson, 2008). Previous research has supported this notion that parental support (i.e., connectedness) promotes desirable outcomes for adolescents, including conformity to adult standards for behavior (for review, see Baumrind, 1991 and Demo, 1992; Resnick et al., 1997), and that lack of parental support is associated with negative outcomes including delinquency and other problem behaviors (e.g., Barnes, Reifman, Farrell, & Dintcheff, 2000; Dekovic, Buist, & Reitz, 2004; Resnick et al., 1997).

Parental connectedness may also shape the social spheres children and adolescents occupy, as well as adolescents' engagement in school, both academically and in extra-curricular activities. Because adolescents tend to associate with individuals who are similar to themselves, initial parenting practices that shape the values, attitudes, interests, and behaviors of children subsequently influence the peer groups to which adolescents are drawn (Brown, Mounts, Lamborn, & Steinberg, 1993; Tilton-Weaver & Galambos, 2003). In addition, parents tend to engage in peer management behaviors, such as supporting the initiation of desirable relationships or prohibiting the formation or

continuation of undesirable ones (Mounts, 2002; Tilton-Weaver & Galambos, 2003). For example, involved parents can encourage their children to associate with pro-social peers by providing opportunities for the children to interact and forge strong bonds that will last into adolescence. Alternatively, negative parental behavior such as substance use and difficult temperament can drive adolescents to seek support and guidance from other sources such as deviant peer groups (e.g., Blackson, Tarter, Loeber, Ammerman, & Windle, 1996). Adolescents with weaker ties to their parents tend to be more likely to seek support and intimacy elsewhere, such as through sexual contact with peers (Feldman & Brown, 1993; Whitbeck, Conger, & Kao, 1993; Whitbeck Hoyt, Miller, and Kao, 1992).

Scaramella and colleagues (1998) found that greater parental warmth and involvement at grade seven predicted fewer deviant peer associations. In addition, Metzler et al.'s (1994) analysis of three separate samples consistently revealed that lower family involvement indirectly predicted significantly greater association with deviant peers through coercive parent-child interactions and poor parental monitoring. The authors contend that low levels of positive family involvement weaken the familyadolescent relationship thereby increasing the adolescent's susceptibility to deviant peers' influence.

Engaged, supportive parents are also better able to encourage young people to do their best in school and offer the resources (e.g., transportation, money for membership fees, social support) for participating in extra-curricular activities that can promote positive engagement with the school setting. Furthermore, parents who are positively connected and involved in their children's education may be more positively connected to

the school, thereby reinforcing the interest and investment of the educators and support staff at the school in the involved parent's child. Such interest and investment by educators can facilitate more positive educational outcomes and school connectedness for the individual child. For example, Scaramella and colleagues (1998) found that greater parental warmth and involvement at grade seven predicted greater academic competence at grade eight. Similarly, supportive parenting in grades seven through nine positively predicted academic engagement in grades eight through ten in a 14-year study involving 451 primarily white, lower middle or middle class families. The authors also found that supportive parenting was most important for predicting academic engagement in early adolescence, with declining importance as adolescents aged (Melby, Conger, Fang, Wickrama, & Conger, 2008). Analysis of the nationally representative, longitudinal data from the Add Health study found that emotional distance in the parent-child relationship was associated with increased academic problems (Crosnoe & Elder, 2004). In addition, Elias, Patrikakou, and Weissberg (2007) presented both empirical and anecdotal evidence of the great potential for positive youth development when supportive, involved parents partner with schools to create settings that are attentive to the emotional, social, and cognitive needs of developing youth.

Taken collectively, the research on parent-child relationships indicates the importance of parental connectedness for predicting the development of problem behaviors. Parents with positive relationships to their children have the power to influence children's and adolescents' peer groups and school connectedness. Furthermore, some researchers have argued that parental connectedness may be more important for predicting behavior among younger adolescents compared to youth in late

adolescence, making it a particularly relevant predictor when examining youth in early high school as will be done in the proposed study (Melby et al., 2008; Regnerus & Luchies, 2006).

Parental Connectedness and Early Sexual Initiation. When specifically focusing on sexual development, evidence suggests that "the influence parents have over their adolescents in the sexual domain is more likely to be indirect than as a result of direct communications" (Moore and Rosenthal, 2006, p.103; Metzler et al., 1994). Parental connectedness may be one key indirect way in which parents influence sexual behavior. The term indirect refers to the lack of direct reference to sex or sexual behavior in the parent-child interactions. The sexual behavior literature references parental connectedness in a variety of ways, including degree of attachment, closeness, connectedness, cohesion, perceived quality of interactions, positive family relationships, and parental warmth. For consistency, this will be referred to as parental connectedness.

Reviews of the adolescent sexual behavior literature report parental connectedness tends to be a protective factor that promotes delayed adolescent sexual initiation; however, this finding did not persist across all studies (Goodson et al., 1997; Kirby, 2002a; Miller et al., 2001; Smith et al., 2005). Miller, Benson, and Galbraith (2001) reviewed all literature published between 1980 and 1999 that studied the impact of familial factors on sexual outcomes related to adolescent pregnancy, including age of sexual intercourse onset (approximately 195 empirical studies, the vast majority of which were published in peer-reviewed journals). The most consistent finding across studies was that parent-child connectedness (i.e., support, closeness, and warmth) protects against pregnancy risk largely through the delaying and reducing of adolescent sexual

intercourse. It is worth noting, however, that the article does not describe the selection criteria for studies included. There was also great variation across studies in the degree of methodological sophistication. Finally, effect sizes were rarely reported in the studies, and the review authors did not compute effect sizes.

While the lack of methodological consistency and unavailability of effect sizes poses problems for comparing study findings and assessing the magnitude of the various effects, Miller et al. contend that this article is "based on the premise that a pattern of findings can be compelling, especially when studies differ in their methods (p. 26)." They argue that null or contradictory findings in the field likely reflect problems with research quality. Useful insights can certainly be obtained from imperfect studies that reflect diverse strategies for learning about this phenomenon. Given the great challenges of studying adolescent sexuality in applied settings, convergence of findings, with interspersed null findings, should be taken as guidance for future studies rather than disregarded.

Lending further support for the association between parental connectedness and early sexual initiation, Smith, Guthrie, and Oakley (2005) conducted a review of 94 studies that examined male adolescent sexuality (17% were exclusively male samples, the rest included females but engaged in gender specific analyses) published between 1965 and 2003 (three-fourths of the studies were published after 1990) all of which included a sample of males between 9 and 19 years of age or focused on adolescence in the case of retrospective studies. The majority of studies were published in peer-reviewed journals with samples ranging from 20 to more than 1,500 (more than 38% of study samples

included 500 or more participants). This review concluded that family functioning (e.g., degree of connectedness) is essential to understanding adolescent male sexual activity.

Similarly, Goodson et al. (1997), in their review of research from 1984 to 1994 on female adolescents' onset of sexual intercourse, reported that parental connectedness was protective against early initiation. The authors synthesized 49 peer-reviewed empirical studies that provided insight into the early sexual debut of American adolescent girls (defined as prior to age 18). This review did not report effect sizes for individual study findings, and the analyses employed were predominantly univariate (63%). Despite these limitations, the volume of significant environmental correlates (e.g., familial- and peerrelated variables) with sexual onset supports the inclusion of familial predictors in the present study.

The previously mentioned reviews tended to include more cross-sectional than longitudinal research. When focusing on longitudinal research a somewhat more complex picture emerges. Consistent with previous reviews, Moore and Rosenthal summarized findings from the National Longitudinal Study of Adolescent Health (Add Health) indicating that sexual debut occurs later in youth from families with a "high sense of connectedness, that is, where there is a high perceived degree of closeness, caring, feeling understood, loved and wanted, and where the adolescent feels satisfied with parental relationships (2006, p. 101-102)."

In their review of 35 longitudinal research studies published in peer-reviewed journals from 1995-2004, Zimmer-Gembeck and Helfand (2008) reported that only 6 of 13 studies that included parental connectedness found a small delaying effect. Studies were included if they met the following criteria: 1) the studies were longitudinal in design with at least one assessment of correlates of sexual behavior prior to an assessment of sexual behavior, 2) the first wave of assessment occurred when participants were younger than 18 years of age, 3) adolescent experiences of sexual intercourse were measured, 4) more than one potential correlate was included, and 5) a community-based sample of U.S. adolescents was used. Sample sizes ranged from 34 to 7,967 and study duration ranged from 2 to 13 waves over the course of 13 years. Most studies used multivariate analyses (with 2-28 variables) to predict onset of sexual intercourse. The authors computed common effect sizes for each finding in order to increase comparability across studies. All conclusions drawn by the authors were based on the common effect sizes and consistency of significant effects across studies. This review was the most rigorous of the literature reviews examined and synthesizes some of the most methodologically sound studies in the field. As such, it is disconcerting to observe that slightly less than half of the studies detected only a weak effect of parental connectedness on delaying sexual initiation.

In an effort to explain the weak and inconsistent finding, Zimmer-Gembeck and Helfand (2008) argue that it is possible this diminished effect is due to the inclusion of other more proximal predictor variables such as peers and individual problem behaviors, rather than suggesting that parental predictors are irrelevant to sexual initiation. For example, French and Dishion (2003) used a prospective design that followed a sample of 10 through 14 year olds for approximately 4 years to assess factors that influenced sexual initiation. Family level variables included family structure, parental monitoring, relationship quality, and parental coercion. Contrary to previous studies, none of the family level variables were significant in the multivariate analysis. Only deviant peer

associations remained a significant predictor of sexual initiation in the full multivariate model. If proximal variables mediate the relationship between parental connectedness and sexual initiation, then one would expect the main effect of parental connectedness to decrease or disappear completely when those mediating variables are included in the model. In testing a social contextual model of pregnancy, Scaramella and colleagues (1998) found evidence for peers and risky individual behavior as mediators of the effect of parental warmth and involvement (i.e., connectedness) on pregnancy, supporting Zimmer-Gembeck and Helfand's notion that the mixed findings observed across studies may be due to model misspecification.

In summary, parental connectedness is a salient construct to the healthy development of adolescents. Research suggests the degree of parental connectedness may influence adolescents' peer group, school performance and connectedness, and problem behaviors. The evidence regarding the relevance of parental connectedness to sexual initiation is somewhat inconsistent. Cross-sectional research tends to indicate it is a useful predictor for both male and female sexual initiation, protecting against early initiation. Longitudinal research findings are slightly more mixed, suggesting weak or non-significant effects on early debut. However, both the authors of the most rigorous review of sexual initiation research to date (Zimmer-Gembeck & Helfand, 2008) and findings from a study of other sexual behavior outcomes (Scaramella et al., 1998) suggest that parental connectedness has been inappropriately modeled in previous research. Based on these works, parental connectedness should be treated as a distal predictor of sexual initiation that is mediated by more proximal influences, such as peers and risky individual behavior.

The current study will build on the previous research on parental connectedness in two primary ways. First, it will act as a replication of previous research by testing the direct effect of parental connectedness on early sexual initiation, while accounting for other relevant predictors. Second, it will examine the indirect effects of parental connectedness through deviant peer associations, school connectedness, and individual problem behaviors.

Peer Influences

Peers and Development. As young people transition from childhood to adolescence, there are changes in the nature and role of the peer group. With adolescence comes a detachment from parents and/or familial adults; independence is sought and beliefs, behaviors, and interests become more strongly influenced by the peer group (Harris & Cavanagh, 2008). In this section of the literature review, I will briefly review the ways in which the peer group changes in adolescence and the ways in which peers influence one another in order to provide context for thinking about the importance of peers in behavior development. Then I will review the research findings regarding the relationship between early sexual initiation and peer sexual and deviant behavior (i.e., non-normative behaviors such as substance use).

Brown (1990) identified three key changes in the role of the peer group occurring during adolescence. First, the majority of adolescents' time is spent with friends rather than parents. This transition provides the opportunity for friends to influence one another and to be exposed to ideas, values, and behaviors that are distinct from those of one's parents. Second, adolescent peer groups operate with greater autonomy than child peer groups; the absence or minimization of parental supervision redefines the parameters of

possible activities in which youth may engage. This opens the possibility for youth to engage in behaviors that adults would prevent were they present. Finally, in adolescence the peer group transitions from girls- or boys-only clubs to become mixed gender groups, thus, providing a network of possible heterosexual dating partners and opening the door for heterosexual romantic relationships and sexual exploration.

As already discussed, parents may influence the peers with whom children and adolescents associate (i.e., the peer groups children and adolescents select into). Once they have identified with a peer group, there are a myriad of ways in which that group may influence individual behavior. In a chapter summarizing research on the indicators of the peer environment, Harris and Cavanaugh (2008) highlight four mechanisms of peer influence: peer pressure, modeling, norm setting, and providing opportunities. Peer pressure occurs through direct statements or actions encouraging or discouraging specific behaviors. Modeling reflects a more indirect form of influence; individuals learn from observing the behaviors of others. In some cases individuals will adopt the behaviors of those they admire, and in other cases they may learn from the mistakes of other less savvy individuals. Peer group norms reflect acceptable attitudes and behaviors, and may be contingencies for continued membership within the peer group. Norms are set through an ongoing process of direct (e.g., peer pressure) and indirect communication (e.g., modeling). Finally, peer groups may determine what behavioral opportunities emerge. Young people will vary in the extent to which they have access to adult-free physical space, exposure to alcohol or other substances, and the degree of sexual curiosity and experience. Depending on the make up of one's peer group, an adolescent may have

greater or fewer opportunities to engage in non-normative behaviors such as early sexual initiation or other risk-taking behaviors.

The mechanisms of peer influence are consistent with the Theories of Reasoned Action and Planned Behavior (Ajzen, 1991; Fishbein & Ajzen, 1975) which posit that behavior is indirectly influenced by one's perception of social norms as well as normative beliefs, both of which can be shaped by the peer group. Similarly, French and Dishion (2003) suggested that the influence of peers may be explained by social-contagion model, that the "speed of (behavioral) transmission is determined by the attraction of the behavior and the availability of potential participants" (p. 309). Deviant social groups likely tolerate if not encourage members to engage in a variety of socially unacceptable behaviors (including age-inappropriate behaviors such as early sexual activity). In addition, within a deviant social group where some members are sexually active they will normalize and quite possibly encourage sexual experimentation of other group members, thereby creating a setting primed for "spreading" sexual initiation.

Peers and Early Sexual Initiation. Consistent with theories regarding social influence, research suggests there is an association between sexual behavior and peer group deviant behavior, such that young people with peers who engage in deviant behaviors (e.g., alcohol use, drug use, stealing) are more likely to engage in risky sexual behavior and specifically early sexual activity (Browning, Leventhal, & Brooks-Gunn, 2004; Cavanagh, 2004; French & Dishion, 2003; Jessor et al., 1995; Kinsman, Romer, Furstenberg, & Schwarz, 1998; Kirby, 2002a; Kotchick et al., 2001; Roche et al., 2005; Small & Luster, 1994; Whitbeck, Yoder, Hoyt, & Conger, 1999). For instance, Roche and colleagues (2005) examined the influence of deviant peer associations (i.e., the number of best friends who drink, smoke cigarettes, and/or use marijuana) on the likelihood of initiating sexual activity by eighth or ninth grade with a sample of 2,559 seventh and eighth graders from the National Longitudinal Study of Adolescent Health (Add Health). Accounting for individual level variables (i.e., race, gender, pubertal development), family level variables (i.e., family structure, household income, parenting practices), and neighborhood socioeconomic status, affiliating with deviant peers resulted in a significantly greater likelihood of early sexual initiation.

Zimmer-Gembeck and Helfand's (2008) review of rigorous longitudinal research published from 1995 to 2004 identified eight studies that examined the influence of a deviant peer group on individual sexual initiation. Six of the eight studies had significant findings, with small to moderate effect sizes. The review authors reported a stronger association between peer deviant behavior and sexual debut among early adolescents compared to middle or late adolescents, making deviant peer groups a particularly relevant construct for studies of early sexual initiation.

Not surprisingly, studies repeatedly find that adolescents with sexually active friends are more likely to be sexually active themselves. Goodson, Evans, & Edmundson's (1997) review of 49 studies of female sexual behavior reported seven studies supporting the influence of close friends' sexual behavior (both perceived sexual behaviors as well as actual behaviors) on the early onset of sexual intercourse. Similarly, Smith and colleagues (2005) review of 94 male adolescent sexual behavior research studies from 1965 to 2003 reported that peer pressures among friends influence adolescent male behavior, values, and attitudes based on eight published papers. Kotchick et al.'s (2001) review of approximately 120 articles examining adolescent sexual risk-

taking published from 1990 to 1999 supported the important influence peers' sexual behaviors (both perceived and actual) have on adolescent sexual activity, such that adolescents with peers who engage in (or are perceived to engage in) risky sexual behavior are more likely to engage in such behaviors.

Buhi and Goodson (2007) reviewed 69 peer-reviewed empirical papers published between 1996 and 2005 that focused on US adolescents between 11 and 18 years of age. The authors state that youths' perceptions of norms among their peers are generally stable predictors of sexual behavior, with very few findings suggesting no relationship. Specifically, seven studies found that students who report that most of their peers have had sex are more likely to report the intention to have sex and/or early sexual debut compared to three studies with non-significant findings. It is worth noting that two of the studies with non-significant findings involved slightly older adolescents (one age range 14 to 17 years and one mean sample age of 16.5 years), which may account for the nonsignificant findings. In longitudinal research, peer sexual behavior has been under examined in recent studies. Zimmer-Gembeck and Helfand's (2008) review of the longitudinal research from 1995 to 2004 only found two studies that included peer sexual behavior, both of which reported peer sexual behavior significantly predicted sexual debut.

In summary, peers are powerful socializing agents during early adolescence. Research is generally consistent in suggesting the importance of peer influences on early sexual initiation for both males and females, particularly associating with deviant peers and/or peers who are or are perceived to be sexually active. The proposed study will build on previous research by prospectively examining the influence of deviant peer

associations (i.e., peers who use substances and/or engage in sexual intercourse) on the initiation of sexual behavior, both directly and indirectly through the development of other problem behaviors. In addition, deviant peer associations will be modeled as a mediator of the relationship between parental connectedness and early sexual initiation. As previously described, parents have the potential to influence peer associations in adolescence. By testing deviant peer associations as a mediator, this study will examine whether parents' behaviors influence students' involvement with deviant peers thereby directing their interests away from problem behaviors and decreasing the likelihood of early sexual initiation.

School Connectedness

School Connectedness and Development. In adolescence, youth spend the majority of their time in the school setting; therefore, schools have great potential to influence behavior. Of particular interest in the current study is school connectedness. School connectedness reflects adolescents engagement with the school setting as indicated by traditional academic engagement such as grade point average, honor roll status, or self reported school performance, involvement in school activities such as clubs or sports, and/or school attachment as indicated by things such as positive relationships with teachers and feeling safe while at school (Kirby, 2002b; L'Engle & Jackson, 2008; Libbey, 2004; Ohannesian & Crockett, 1993; Resnick et al., 1997).

Researchers have often treated academic performance as an individual level variable; however, following the approach of L'Engle & Jackson (2008), school connectedness in this study will be discussed as a school-level variable. Consistent with treating parental connectedness as a familial-level variable because it reflects the

interplay between parent and adolescent, school connectedness is considered a schoollevel variable because it results from engagement on both the side of the adolescent and the school (e.g., teachers' and administrative staff members' interactions with students). This section of the literature review will first establish the relevance of school connectedness to development. Then, the literature linking school connectedness-related variables to sexual initiation will be reviewed.

Connectedness to one's school has been identified as a protective factor against risk behaviors (see Kirby 2002b; Resnick et al., 1997). Positive connections to one's school may be protective for several reasons (Kirby, 2002b). First, school connectedness suggests exposure to adult role models (e.g., teachers, counselors, and school nurses) who ideally continue to instill the values and behavioral standards expected of adolescents in the dominant culture. These adults may discourage risk-taking behaviors such as early sexual activity, substances use, or other delinquent behaviors. Second, engagement in school also suggests that one's time is being positively occupied. During the school day, students rarely have the opportunity to engage in sex (Kirby, 2002b). In addition, academically successful students must study during their free time, suggesting they have less time to engage in negative behaviors (Ohannessian & Crockett, 1993). Third, some research suggests that students who are more engaged at school have a greater future orientation and are therefore less likely to engage in behaviors that may jeopardize that future (e.g., Kirby, 2002b; Zimmer-Gembeck & Helfand, 2008). Schvaneveldt and colleagues (2001) suggested that Social Exchange Theory may explain the relationship between strong future orientations and decreased likelihood of engaging risk-taking behaviors, such that the perceived risks to one's future educational and career goals (e.g.,

if one became pregnant or contracted a STI) outweigh the potential benefits of sexual activity (e.g., satisfying a biological urge or curiosity). In summary, school connectedness may promote healthy development through a variety of mechanisms, making it a prime construct of interest when studying adolescents' sexual behavior.

School Connectedness and Early Sexual Initiation. When school-related factors are examined, sexual initiation studies tend to focus on academic performance. Generally, worse school performance appears to be associated with greater risk for early sexual initiation (Kotchick et al., 2001; Lammers, Ireland, Resnick, & Blum 2000; L'Engle & Jackson, 2008; Perkins, Luster, Villaruel & Small, 1998; Schvaneveldt\ et al., 2001; Zimmer-Gembeck & Helfand, 2008). For example, Zimmer-Gembeck and Helfand (2008) reported on 11 longitudinal studies from eight independent samples that examined academic performance. In seven samples (four using multivariate analyses and three using univariate analyses), academic performance (i.e., lower grades and other schoolrelated problem behaviors) was associated with sexual onset, particularly in studies that focused on early adolescence. Similarly, Kirby (2002a, 2002b) and Kotchick et al. (2001) reported that better academic performance was protective against early sexual onset and other risky sexual behaviors.

School-related constructs that extend beyond academic performance have been relatively neglected in the sexual initiation literature (L'Engle & Jackson, 2008). When studied, school connectedness negatively relates to early sexual initiation (Kirby, 2002a; 2002b; L'Engle & Jackson, 2008; Resnick et al., 1997). For instance, L'Engle and Jackson (2008) examined school connectedness in their longitudinal study of sexual initiation. At time one, 854 seventh and eighth grade students from across the state of

North Carolina completed surveys that measured family, peer, school, and media exposure variables. Controlling for all other variables, positive school connectedness was significantly inversely related to sexual initiation 2 years later. Consistent with these findings, Smith and colleagues (2005), in their review of the male sexual behavior literature, cited a need for more research that accounts for school connectedness as a protective factor against early sexual initiation.

In summary, schools are potentially powerful socializing settings during childhood and adolescence. Schools and school-related activities provide exposure to adult role models who provide additional values and behavioral training to youth regarding what is socially acceptable, occupy large amounts of youth's time, and can aid youth in maintaining a future orientation that decreases engagement in activities that jeopardize their future. Existing research on school connectedness and early sexual initiation is limited. Researchers have historically focused more on academic Performance rather than the broader construct of school connectedness, finding that better academic performance is associated delayed sexual debut.

In addition, previous sexual initiation research has typically only examined the direct effect of school-related variables. However, Scaramella and colleagues (1998) **Provide** a model for examining the intersections between the family, peers, and school **Systems**. The authors treated academic competence (i.e., grades) as an explanatory **Variab**le mediating the relationship between parental warmth and involvement and risk**taking** behavior. Their rationale for such a model was that involved, warm parents are **more** likely to encourage academic competence because "such parenting positively **reinfor**ces adherence to academic demands (p. 1236)." They offered the work of Glasgow
and c relati shap the e busi med , bis ris) 85 the ųć X ł Ī(1 and colleagues (1997) and Steinberg et al. (1992) as empirical support for this relationship. Scaramella and colleagues (1998) further explained that parents' efforts to shape their children's behaviors (i.e., academic engagement) would subsequently deter the emergence of risk-taking behaviors and ultimately reduce the occurrence of teen pregnancy. The authors found that academic competence at eighth grade partially mediated the relationship between parental warmth and involvement in seventh grade and pregnancy status at twelfth grade (they did not find that the relationship flowed through risk-taking behavior as initially hypothesized). This treatment of school-related variables as a mediator emphasizes the role of parents as primary socializing agents and shapers of the pro-social behaviors in which adolescents engage that ultimately can be protective against future troubling sexual behavior-related outcomes (e.g., teen pregnancy).

Given the limited findings presented above along with the developmental value of school connectedness, the literature would benefit from a broader conceptualization of the role of schools and academic engagement. The proposed study will build on previous research by examining the impact of school connectedness on early sexual initiation, both directly and indirectly through the development of other problem behaviors. In addition, school connectedness will be modeled as a mediator of the relationship between parental connectedness and early sexual initiation. By testing school connectedness as a mediator, this study will examine whether parents' behaviors influence students' academic engagement thereby directing their interests away from problem behaviors and decreasing the likelihood of early sexual initiation.

Individual Problem Behaviors

Problem Behavior Theory. Problem behavior theory posits that engagement in problem behaviors can result in a shift in mindset, such that individuals who have engaged in risk-taking or problem behaviors that violate social conventions are more willing to engage in additional non-normative behaviors (Jessor, 1987; Schvanveldt et al., 2001). Problem behavior theory, similar to other social attachment theories, also suggests that individuals who are more disconnected from conventional institutions (e.g., farmilies and schools) are more likely to engage in socially sanctioned behaviors (e.g., Jessor, 1987; L'Engle & Jackson, 2008; Scaramella et al., 1998). This theory has been supported in research on adolescent behaviors including delinquency, substance use, and sexual behavior (e.g., Jessor; 1987; Resnick et al., 1997).

Individual Problem Behaviors and Early Sexual Initiation. Consistent with this line of thinking, initiation of problem behaviors such as substance use and delinquency have been linked empirically to subsequent early sexual debut (for reviews see Goodson et al., 1997; Kirby, 2002a; Miller et al., 2001; Smith et al., 2005; Zimmer-Gembeck & Helfand,2008). However, the same problem behaviors are not consistently associated with early sexual initiation across studies or types of analyses. Zimmer-Gembeck and Helfand's (2008) review of longitudinal research published between 1995 and 2004 identified 16 studies drawing from 13 samples that examined whether problem behaviors were a precursor to sexual initiation. Interestingly, all but one study revealed a significant relationship with bivariate analyses; however, only 33% of studies that controlled for other predictors found problem behaviors significantly predicted early sexual initiation. Based on the existing evidence, the authors suggest that alcohol use and

delinquency/antisocial behavior are the most important problem behavior-related predictors to include in studies of early sexual initiation, with delinquency/antisocial behavior appearing to be more predictive for boys than girls.

Contrary to Zimmer-Gembeck and Helfand's findings, in their review of primarily cross-sectional research on female sexual behavior published from 1984 to 1994, Goodson et al. (1997) reported delinquency and aggressive behavior were risk factors for female initiation. This contradiction in findings regarding the relevance of delinquency for predicting female sexual initiation may be due to the distinct levels of analytic sophistication employed in the studies reviewed. Recall that Zimmer-Gembeck and Helfand (2008) exclusively reviewed studies involving longitudinal data and more than one correlate with sexual initiation. Goodson et al. (1997) reviewed more crosssectional than longitudinal research. Their selection criteria did not require the simultaneous examination of multiple correlates. It is possible that the significant findings for female delinquency and aggressive behaviors observed in the less ^{so}phisticated analyses would no longer be significant once other variables were accounted for or once the effect of change over time were taken into account.

Also contradicting Zimmer-Gembeck and Helfand's findings, Smith et al.'s (2005) review of primarily cross-sectional male sexual behavior research published between 1965 and 2003 found a link between alcohol and marijuana use and sexual initiation, but no link between delinquency and male sexual initiation. In two of the crosssectional studies reviewed by Smith and colleagues, male participants who had not engaged in problem behaviors were equally likely to be sexually active as youth who had engaged in other problem behaviors. It is possible that for some male students sexual

activity emerges as the first problem behavior adopted, which then primes the youth to engage in subsequent problem behaviors. Given the limited number of direct biological risks (e.g., pregnancy) and society's general valuing and promotion of male sexual initiation compared to female sexual initiation, it is possible that early sexual initiation is a more attractive gateway problem behavior for males than females. Alternatively, it is possible that the variation in rates of sexual initiation among boys who engage in problem behaviors and those who do not are best observed when the temporal ordering of events is accounted for in longitudinal studies such as those reviewed by Zimmer-Gembeck and Helfand.

In summary, the longitudinal research suggests that engaging in other problem behaviors is a significant predictor of early initiation. There is some debate regarding which problem behaviors are most important to include, with particular distinctions emerging depending on the sophistication of analytic techniques as well as the sex of the Participants. In general, substance use and delinquency appear to be the most important **Problem** behaviors to include in studies or early sexual initiation.

The proposed study will examine the extent to which individual problem behaviors directly predict early sexual initiation. Consistent with problem behavior theory, it will also examine the degree to which problem behaviors mediate the relationship between parental connectedness, deviant-peer associations, school connectedness and early sexual initiation such that individuals with fewer positive connections to social institutions will be more likely to engage in problem behaviors and subsequently engage in sexual initiation. Limitations of the Extant Literature

While research on adolescent sexual behavior conducted over the past several decades has been extensive, the body of research on sexual initiation has several *limitations*, most of which pertain to design flaws, that will be addressed in the proposed study: 1) predominantly cross-sectional designs, 2) including youth who are at distinct developmental stages in the same sample, 3) over-reliance on bivariate analysis, and 4) examining single systems or treating systems as independent.

First, multiple literature reviews that captured findings relevant to early sexual initiation reported that the majority of research on sexual initiation has been crosssectional (Buhi & Goodson, 2007; Goodson et al., 1997; Kirby, 2002a; Kotchick et al., **2001**; Miller et al., 2001; Smith et al., 2005; Zimmer-Gembeck & Helfand, 2008). Of over 1,000 articles found when searching the literature from 1995 through 2004, Zimmer-Gembeck and Helfand (2008) found only 35 longitudinal studies drawn from 26 independent samples. In their review of the literature, Buhi and Goodson (2007) observed a lack of methodological improvement in the field of adolescent sexual behavior compared to Goodson et al.'s (1997) review of the literature from a decade earlier, with 46% of the studies from 1996 to 2005 utilizing longitudinal data and 41% of studies from 1984 to 1994 examined longitudinal data. While cross-sectional research can be useful at the exploratory stages of knowledge development, the sexual initiation research literature is in need of longitudinal, prospective designs that allow for differentiation of the temporal ordering of variables. Such work assists in teasing apart the bidirectional relationships observed in the cross-sectional studies in order isolate the causal variables from correlational variables (Kotchick et al., 2001; Zimmer-Gembeck & Helfand, 2008).

To address this limitation, the proposed study will use a prospective design to predict **sexual** initiation approximately 1 year after the baseline data were collected.

Second, much of the research literature to date fails to differentiate timing of initiation by age effectively. Samples frequently contain a wide age range, and some literature reviews even defined early onset as anything prior to the age of 18 (e.g., Goodson et al, 1997; Kirby, 2002a). This treats individuals initiating sex at a normative age (ages 16 to 18) and individuals initiating sex at a non-normative age as equivalent, inappropriately lumping youth of different ages and developmental stages together. Life course theory states that influences on behavior, development, and adjustment are likely to **differ** depending on age and life stage (Crosnoe & Elder, 2004). Many adolescent ages are distinct, both by biological standards and social standards. For example, by age 17 one is toward the end of pubertal development, with secondary sex characteristics evident; whereas a 14 year old is typically much earlier in the developmental process with secondary sex characteristics still emerging. Socially and legally, 17 year olds are afforded more responsibilities and rights in the United States, likening them closer to an adult than a child; whereas a 14 year old still is not permitted to drive, work, or legally consent to sexual intercourse. Furthermore, the outcomes findings presented earlier indicated distinct negative effects on individuals initiating sex early (age 15 or younger) relative to those initiating later in adolescence. After reviewing the longitudinal literature, Zimmer-Gembeck and Helfand (2008) called for cohort specific analyses in order to better understand antecedents that differ depending on developmental stage, suggesting that there is a distinct pathway to non-normative early sexual initiation. Smith and colleagues (2005) similarly called for more research focusing on youth age 15 and

younger. To address this limitation of previous research, the proposed study will focus on a cohort of students transitioning from freshman to sophomore year in high school (age 14 to 15 approximately).

The third limitation of previous research is the over use of bivariate analysis (Buhi & Goodson, 2007; Goodson et al., 1997; Kirby, 2002a; Kotchick et al., 2001). Buhi and Goodson (2007) compared the use of univariate analyses (defined as one predictor and one outcome variable) in literature spanning 1984 to 1994 to literature spanning 1996 to **2005** and observed an increase in the reliance on univariate analysis in the recent literature (63% of studies from 1984 to 1994 compared to 78% from 1996 to 2005). Univariate or bivariate analyses fail to reflect the complexity of behavior. Antecedents to sexual initiation do not function in isolation. It is common for the results of univariate analyses to be significant, but once the variables are modeled with other predictors, the effects disappear. By primarily relying on univariate or bivariate analytic techniques, researchers maybe reaching erroneous conclusions about the value of any given variable. To more accurately represent the predictive utility of each variable, they need to be modeled simultaneously using more sophisticated analytic techniques. The proposed study will examine individual, family, peer, and school-related variables in the same model using structural equation modeling in order to improve our understanding of the unique contribution of each variable while accounting for all other variables.

The fourth limitation, the failure to engage in multisystemic research that models the intersection or combination of different environmental influences, is similar to the third limitation in that it reflects the oversimplification of behavior. Historically, research on adolescent sexual behavior has focused at the individual level (DiClemente, Salazar,

& Crosby, 2007; Kotchick et al., 2001). The research to date that extends beyond the

individual consistently documents the influence of the environment on behavior,

particularly the influence of peers and families (Buhi & Goodson, 2007; Goodson et al.,

1997; Kirby, 2002a; Kotchick et al., 2001; Miller et al., 2001; Smith et al., 2005;

Zimmer-Gembeck & Helfand, 2008). Bronfennbrenner's (1979) ecological model posits

that individuals are nested within contexts. The family, peer group, and school are

interrelated, yet distinct microsystems that influence the individual. The failure to take a

multisystemic perspective in designing and implementing studies ignores the

interrelationships across systems. This over-simplification of behavior may result in

erroneous conclusions. In studies that simultaneously examine the influence of

individual, familial, peer, and/or school variables, they often only examined main effects

of each variable, thus failing to account for the intersecting influences of these systems

by treating them as independent (e.g., Small & Luster, 1994). As argued so clearly by

Kotchick and colleagues (2001),

"factors from multiple systems of influence interact or combine with each other to shape behavior. A multisystemic perspective would suggest that the relations among these systems are transactional and interactional, with each system exerting both direct and indirect effects on behavior (p. 497)."

The authors went on to call for more work examining possible mediational and moderational relationships among the systems of influence identified through current research- such relationships can be informative for understanding the mechanisms and leverage points that may improve the effectiveness of interventions. Responding to this call, the proposed study will examine the mediating effects of peer-, school-, and individual-related influences on the relationship between familial factors and early sexual initiation To summarize, the proposed study will follow a cohort of adolescents for approximately 1 year, from their freshman to sophomore years in high school. While there may be some variation in age within grade, this sampling technique should minimize developmental differences relative to other studies in which participants' ages spanned many years. By looking prospectively at sexual initiation during the transition from freshman to sophomore year in high school, this study will examine the specific antecedents associated with the pathway leading to sexual initiation between ages 14 and 15 (approximately). This also allows for stronger causal/predictive statements compared to cross-sectional designs. Finally, this study will investigate the powerful social influences of family, peers, and schools, specifically targeting the intersection of these microsystems while replicating the findings of past research. The next section will review the conceptual model the proposed study will test.

Current Study: Social Contextual Model of Early Sexual Initiation

Using previously collected data and a multisystemic perspective, the current study sought to identify pathways to sexual initiation occurring between the freshman and sophomore years of high school. The conceptual model that was examined in this study (Figure 1) built on the social contextual model of teen pregnancy tested by Scaramella and colleagues (1998). Consistent with social influence theories (e.g., problem behavior theory, social control theory, theory of planned behavior) and an ecological perspective, this model reflects the interdependencies across systems at the individual, peer, school, and familial levels.



Figure 1. Social Contextual Model of Early Sexual Initiation

The social contextual model of early sexual initiation reflects the primary role of parents and the parent-child relationship in development, such that parental connectedness influences behavior both directly and indirectly. Whereas past research has almost exclusively examined the main effects of school, peer, and individual influences on early sexual initiation, this model treats them as explanatory variables mediating the relationship between parental connectedness and early sexual initiation. This model suggests that it is through their influence on school connectedness, peer associations, and individual problem behaviors that parents affect early sexual initiation.

As previously discussed, strong parental bonds are associated with greater desire to conform to behavioral standards suggesting that youth who are more connected to their parents will be less likely to engage in problem behaviors or associate with deviant peers (paths a and b, respectively) and more likely to be connected to their schools (path c). Less involved parents have less influence over the social context and social relationships youth develop, allowing room for more contact and associations with deviant peers. With

less connection to their parents, adolescents are more open to the values and behavioral norms of their peer group. As such, adolescents with deviant-peer associations will be more likely to engage in the problem behaviors occurring among their peers (path d). Students who are less connected to their schools are more likely to have greater free time (as they are not spending their time in extra-curricular activities or studying) and be less influenced by the positive, pro-social messages of the school setting and therefore will be more likely to engage in problem behaviors (path f).

As reviewed previously, engaging in other problem behaviors may prime adolescents to be more willing to engage in other non-normative behaviors, thus the pathways to problem behavior conclude with a direct link to early sexual initiation (path h). It is possible that the influence of deviant peer associations and school connectedness may not flow exclusively through problem behaviors. As such, a direct path from deviant peers to early sexual initiation and school connectedness to early sexual initiation will also be examined (paths e and g respectively). It is important to note that all mediational paths are hypothesized to reflect partial mediation. Given the complexity of human behavior, it seems unlikely that any one of the mediators would fully explain the relationship between the predictors and early sexual initiation.

To provide additional clarity, the hypotheses associated with the social contextual model of early sexual initiation are presented below.

H1 (direct path, not modeled): Adolescents with stronger parental connectedness will be less likely to engage in early sexual activity than adolescents with weaker parental connectedness.

H2 (path a): Adolescents with stronger parental connectedness will engage in fewer problem behaviors than adolescents with weaker parental connectedness. H3 (path b): Adolescents with stronger parental connectedness will have fewer deviant-peer associations than adolescents with weaker parental connectedness. H4 (path c): Adolescents with stronger parental connectedness will have stronger school connectedness than adolescents with weaker parental connectedness. H5 (path d): Adolescents with more deviant-peer associations will engage in more problem behaviors than adolescents with fewer deviant-peer associations. H6 (path e): Adolescents with more deviant-peer associations will be more likely to engage in early sexual activity than adolescents with fewer deviant-peer associations.

H7 (path f): Adolescents with stronger school connectedness will engage in fewer problem behaviors than adolescents with weaker school connectedness.
H8 (path g): Adolescents with stronger school connectedness will be less likely to engage in early sexual activity than adolescents with weaker school connectedness.

H9 (path h): Adolescents who engage in more risk taking behaviors will be more likely to engage in early sexual initiation than adolescents who engage in fewer problem behaviors.

H10 (mediation): The relationship between parental connectedness and early sexual initiation will be partially mediated by problem behaviors.

H11 (mediation): The relationship between parental connectedness and problem behaviors will be partially mediated by deviant-peer associations.

H12 (mediation): The relationship between parental connectedness and problem
behaviors will be partially mediated by school connectedness.
H13 (mediation): The relationship between parental connectedness and early
sexual initiation will be partially mediated by deviant peers.
H14 (mediation): The relationship between parental connectedness and early
sexual initiation will be partially mediated by school connectedness.

Finally, consistent with the extant literature, all analyses will be conducted both for the complete sample and separately for boys and girls in order to explore whether differences exist in the pattern and strength of relationships predicting early sexual initiation. Boys and girls follow unique developmental paths biologically and socially, with different pressures to either abstain or engage in sexual activity. Boys tend to initiate sexual intercourse at younger ages than girls (Kirby, 2002a; Zimmer-Gembeck & Helfand, 2008), although not all studies observe this sex difference (e.g., Abma et al., 2004). As such, it is possible that the constructs most salient for predicting early initiation for girls and boys will differ, resulting in the model tested in this study performing uniquely for boys and girls. Specific hypotheses are not offered, as this is an exploratory endeavor. If no differences emerge, findings from the full sample will be reported.

To summarize, the current study assessed the predictive utility of constructs at the individual, peer, school, and familial levels for determining whether sexual initiation will occur between 14 and 15 years of age. This study improves upon past research by: 1) testing an expanded conceptualization of the role of schools and school connectedness, 2) focusing on a single age group in order to minimize developmental differences across participants, 3) employing a prospective design that provides greater capacity for

determining whether constructs simply covary with sexual initiation as opposed to preceding it, and 4) utilizing more sophisticated structural equation modeling techniques allowing an examination of both the direct and mediational effects across multiple systems of influence. Mic Ŀ nij eia. k: \$B: Met je: 81 1 San 16; st 12 DU. SUC 30 37.5 lò.

METHOD

The current study analyzed data collected during Waves 1 and 2 of the 3-year Michigan Evaluation of School-based Health (MESH) project. The primary purpose of the MESH project was to examine the impact of school-based health centers (SBHC) on middle and high school students' health, academic outcomes, and health care costs. The evaluation contained three distinct studies. First, an outcomes evaluation focused on the health, academic, and attendance outcomes of adolescents in schools with and without SBHCs. Second, a cost evaluation focused on the SBHC impact on health care costs for Medicaid enrolled adolescents. Third, a process evaluation examined the services delivered at the SBHCs. Data for the current study was drawn from the outcomes evaluation.

Sample Recruitment

The outcomes evaluation followed cohorts of sixth and ninth grade students from 16 different schools for 3 years. Using a non-equivalent comparison group design, schools with SBHCs were matched on demographic characteristics (i.e., racial and ethnic make up of the student population, proportion of students receiving free and reduced price lunches, and school size) to schools without SBHCs.

Active parental consent was required by the institutional review board, and, as such, a lengthy, multifaceted recruitment process was employed (see the Appendix A for a copy of the project consent form). Research team members attended parent orientations and open houses, parent-teacher conferences, registration days, and also mailed materials home to parents. At sites where the participation rates remained insufficient, classroom-

based competitions were held where the classroom with the most consent forms returned, regardless of whether consent was granted or declined, received a treat (e.g., pizza party). Out of a total possible sample of 4,412 students, these recruitment efforts yielded parental consent responses for a total of 1,411 students (32% of eligible students), with 277 parents declining to allow their child to participate. Ultimately, parental consent was obtained for 1,134 students, representing 26% of eligible students. Of the 1,134 students whose parents provided consent, 959 (85%; 350 sixth grade students and 609 ninth grade students) provided their written assent to participate in the study and completed a survey.

The current study draws only from the high school student sample. One high school refused to include the sexual behavior questions in the survey. As such, this high school was excluded from the sample. At Wave 1, 522 students across eight high schools completed the survey.

Sample Characteristics

Table 1 presents the demographic characteristics of the 522 ninth grade participants, as well as a breakdown by virginity status at Wave 1. Eight students were excluded from the virginity breakdown and subsequent analyses because it was not possible to determine their virginity status (i.e., five students did not answer the sexual initiation question at either Wave 1 or Wave 2, and three students chose not to answer the sexual initiation question at Wave 1 but indicated they were sexually active at Wave 2). Demographically, these participants were predominantly female students of color (six female students; four African American and one Latino student), consistent with the larger sample's gender and racial composition.

Demographic Characteristic*	All Ninth Graders	Virgins	Non-virgins
	(n = 522)	(n = 378)	(n = 136)
Age (in years)			
Range	13 – 16	13 – 16	13 – 16
Mean, SD	14.33, .62	14.28, .58	14.52, .70
Sex			
Female	54% (n = 284)	58% (n = 220)	43% (n = 59)
Male	46% (n = 238)	42% (n = 158)	57% (n = 77)
Race/Ethnicity			
White	35% (n = 180)	39% (n = 145)	25% (n = 33)
African American	40% (n = 208)	36% (n = 134)	52% (n = 70)
Latino	17% (n = 87)	18% (n = 68)	13% (n = 18)
Asian American	<1% (n = 3)	<1% (n = 3)	0% (n = 0)
Native American	<1% (n = 3)	<1% (n = 2)	<1% (n = 1)
"Other"	7% (n = 37)	7% (n = 25)	9% (n = 12)
Free/Reduced-Price Lunch	65% (n = 325)	63% (n = 231)	69% (n = 88)

Table 1. Sample Demographic Characteristics at Wave 1

*All percentages are based on valid percents; due to rounding, the sample percentages may not sum to 100.

Chi-square tests were computed to examine the racial, sex, and SES (via free/reduced-price lunch) composition of the virgin and non-virgin groups. These tests revealed that significantly fewer white students than expected by chance were not virgins at Time 1 (expected count = 46.7, actual count = 33), and more African American students than expected by chance were not virgins at Time 1 [expected count = 53.5, actual count = 70; χ^2 (3) = 13.94, p < .01]. In addition, significantly more males than

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Procedures

In order to gather data about adolescents' health and health behaviors, the Child Health and Illness Profile—Adolescent Edition (CHIP-AETM) survey was administered during the school day at each site. Depending on the locations available within the schools, surveys were administered in classrooms, auditoriums, libraries or cafeterias. Prior to administering the survey, administration staff completed an assent process with the prospective participants. Students were informed of their participant rights and what the project entailed. Students who assented then completed a survey (see the Appendix A for a copy of the project assent form).

Survey administration staff members were on hand to answer questions about the meaning of terms or the response scales. Survey administration ranged from 30 minutes to approximately 1 hour, depending on students' reading ability. For students who were unable to read the survey themselves in the allotted time, survey administration staff read the survey aloud to students while they selected the answers themselves. Due to extensive absenteeism on initial survey dates, multiple survey administration dates were used at

each site in order to maximize sample size. The same administration procedures were employed in Wave 2.

Measures

Data analyzed in this study were derived from the self-administered CHIP-AETM. This well-validated measure contains 107 items reflecting 6 domains and 20 subdomains intended to provide insight into the overall health status of youth aged 11 to 18 years (see Starfield et al., 2000 for a detailed review of the measure; see Appendix B for information on how to obtain a copy of the CHIP). The CHIP-AETM combines measures of physical, mental, and social aspects of health. The measure was developed based on literature reviews and qualitative research with children, adolescents, and parents, along with input from health professionals and researchers, and underwent extensive pilot testing, validation, and factor analysis. It has been employed with racially and economically diverse middle and high school student samples, in both urban/rural and clinical/community settings (e.g., Starfield et al., 1993; Starfield et al., 1995; Starfield et al., 1996; Starfield et al., 2000). The CHIP-AETM has proved valid and reliable across samples (see Starfield et al., 2000 for a review).

For the purpose of the current study, a subset of items from the CHIP-AETM was used. All constructs examined in this study were drawn from the following subdomains: home safety and health (one item), family involvement (five items), individual risks (11 items), threats to achievement (11 items), peer influences (five items), and academic performance (seven items). When appropriate, entire subdomains were used. However, in order to ensure that the measures reflected the constructs of interest in this study, some items were combined across multiple subdomains. For example, the problem behaviors

scale contained portions of the individual risks subdomain that measured substance use and portions of the threats to achievement subdomain that measured delinquent behaviors. Neither one of these subdomains alone adequately captured the problem behaviors of interest as identified in the sexual initiation literature. As such, items from each subdomain were combined. All reliabilities were examined to ensure the integrity of the newly constructed scales. All scale scoring was consistent with the manual provided by the measure authors (Starfield et al., 2000). All scales were unweighted.

Sexual Initiation. Sexual initiation was measured with a single item drawn from the individual risks subdomain: Have you ever had sexual intercourse (made love or gone all the way)? Response options were "no," "yes," or "don't know." All "don't know" responses were treated as missing data. Students who had not initiated sexual activity by Wave 2 were coded 0, while students who had initiated were coded 1. At Wave 1, all participants were virgins. Sixty-two students (16%) did not report their sexual status at Wave 2. Data from these 62 participants were excluded from all analyses directly predicting early sexual initiation; however, they were retained for the estimation of all other model pathways (via the Mplus missing data function).

Individual Problem Behaviors. All 17 items for this measure were drawn from the risk domain; specifically, 10 items from the individual risks subdomain were combined with seven items from the threats to achievement subdomain. The individual risk items focus on substance use including tobacco, alcohol, and other illicit substances (e.g., "When was the last time you smoked cigarettes?" and "When was the last time you drank hard liquor or mixed drinks?") with response categories ranging from 1= "Never" to 5= "In the past week." The threats to achievement items measure delinquent behaviors (e.g.,

:#];e time v as the partik behar with the s repo ofte). Yon par the Tes, far <u>h</u>er th th Ņ fa 52 H "When was the last time you carried a weapon for protection?" and "When was the last time you stole something worth more than \$10?") and use the same response categories as the individual risk items. The average score across all 17 items was computed for each participant, with higher scores indicating the participant engaged in more problem behaviors. The mean score for the individual problem behaviors scale was 1.26 (SD=.34), with a satisfactory Cronbach's alpha of .76.

Parental Connectedness. The parental connectedness measure was drawn from the seven-item family involvement subdomain. Items in this measure ask participants to report on how many days in the past 4 weeks a set of behaviors happened, such as how often your parents or other familial adults eat meals with you, talk with you or listen to your opinions or ideas, or spend time with you doing something fun. In addition, participants were asked how many days in the past 4 weeks they liked being a member of their family and how many days they got along with their family. These questions had response scales of 1= "no days" to 5= "15-28 days." Two dichotomous items from the family involvement subdomain were excluded from the parental connectedness measure because they did not explicitly reference parents or familial adults (i.e., "do you feel that there is an adult you could turn to for help if you have a real problem" and "do you feel that there are any adults who are really interested in what you do and encourage you to do your best") and were located in an entirely distinct section of the survey from the other family involvement items. After averaging the five items, the parental connectedness scale produced a mean of 3.67 (SD = .98), with a satisfactory Cronbach's alpha of .79. Higher scores reflect greater parental connectedness.

Deviant Peers. The deviant peer measure included the entire peer influences subdomain. This five-item measure assesses the proportion of the respondents' friends who use substances (i.e., drink alcohol, smoke cigarettes, smoke marijuana, or use other drugs) or have sexual intercourse. Response options included 1= "none," 2= "some," 3= "most," and 4= "all." The average score across the five items was computed, with higher scores indicating a greater proportion of deviant peers. The deviant peers scale resulted in a mean of 1.50 (*SD*=.49), with a satisfactory Cronbach's alpha of .82.

School Connectedness. The 12-item school connectedness measure combined items across three subdomains (i.e., academic achievement, threats to achievement, and home safety and health). Two questions ask students to rate how they did in school in the past 4 weeks (range of 1= "Below average student" to 4= "Excellent student") and how they did on their homework in the past 4 weeks (range of 1= "Could have done much better" to 4= "Did very well, could not have done better"). Five dichotomous items (coded 1=no, 4=yes) asked students whether they had, in the past 2 school years, made the honor role, received a school award, been an officer in school club, failed a class (reverse coded), or failed a grade (reverse coded). The following four items were reverse coded: In the last 4 weeks that you were in school, on how many days did you 1) disobey at school, 2) have trouble getting along with your teachers, 3) have trouble concentrating in school, and 4) have trouble getting school work done (response scale ranges from 1= "never" to 5= "15-28 days"). Finally, one item assessed whether students felt they were safe at school (1= "no", 5= "yes"). Because these items were measured with distinct response scales, all items were standardized prior to computing the mean scale score. The standardized school connectedness scale produced a mean of .08 (SD=.47), with a

satisfactory Cronbach's alpha of .70. Higher scores indicate greater school connectedness.

Demographic Characteristics. Basic demographic information was collected from all participants, including sex, race/ethnicity, grade in school, age, whether the participant or a sibling receives free or reduced cost lunches at school, and parents'/guardians' educational background and employment status.

Control Variables. Three variables were tested as control variables: race/ethnicity, family socioeconomic status, and health center status. Past research has tended to find that early sexual initiation prevalence rates vary across racial/ethnic groups. For example, in their review of longitudinal research, Zimmer-Gembeck & Helfand (2008) reported that 11 of 15 studies detected an association between race/ethnicity and early sexual debut, with African American males being 2.8 times more likely to initiate early than white adolescents. In addition, the authors reported that "compared to white adolescents, findings showed (1) earlier onset of sexual intercourse for Black males, but not females, (2) later onset for Asian American adolescents and (3) average age of first intercourse for Hispanic adolescents that was similar to white adolescents" (Zimmer-Gembeck & Helfand, 2008, p. 169).

The 2007 national Youth Risk Behavior survey found that African American students had the highest proportion of early sexual initiators (i.e., prior to age 13; 16.3%) followed by Latino and white students (8.2% and 4.4%, respectively; CDC, 2008). Similarly, another nationally representative study reported that more African American participants debuted by age 15 than White participants (Abma et al., 2004). Analysis of the 1997 National Longitudinal Survey of Youth data revealed that 34% of African

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American youth had debuted prior to age 15 compared to 21% of Latino youth and 16% of white youth (Terry-Humen & Manlove, 2003).

Because the racial/ethnic breakdown of the current sample is not large enough to conduct multiple group comparisons of the full model, the main effect of racial/ethnic group on early sexual initiation was controlled. Race/ethnicity was dummy coded, with white participants (the largest racial/ethnic group in the sample) as the reference group compared to African American participants, Latino participants, and a combined category of "other" participants. Native American, Asian Pacific Islander, and "other" categories were combined due to the small number of individuals who endorsed each category.

Research is inconsistent regarding the association between sexual debut and socioeconomic status (SES). Longitudinal research has not been suggestive of a significant SES effect on sexual initiation (Zimmer-Gembeck & Helfand, 2008); however, reviews of cross-sectional research have detected some SES-related effects on sexual behavior. For example, Kirby (2002) reported that higher income may be protective against early initiation. Similarly, parental education, a proxy for SES, was found to be related to early sexual initiation in some studies. Terry-Humen and Manlove (2003) found that 24% of students whose mothers did not complete high school were sexually active before age 15 compared to 15% of adolescents whose mothers did complete high school. Goodson et al.'s (1997) review of literature involving adolescent females pointed to parent's educational attainment as a protective factor. In addition, Kotchick and colleagues (2001) reported lower SES was associated with increased sexual risk-taking in their review of literature from 1990 to 1999. Taken collectively, these findings suggest that while SES may not be a core component of the social contextual

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model of early sexual initiation, its potential influence on sexual initiation should not be ignored. As such, a composite SES variable was constructed to allow for the effects of SES on early sexual initiation to be controlled.

The composite family SES scale combined measures of financial capital, human capital, and social capital and was constructed following the CHIP-AETM developers' instructions (Ensminger et al., 2000). To develop this measure, the authors compared adolescent reports to mother reports across several samples on SES-related items to assess the accuracy of adolescent reports of family background. In addition, the authors assessed the correlations across items and the ability of different measures to differentiate health outcomes based on extant research findings. Ultimately, the authors recommended the use of a mean composite measure including the following items: mother/female guardian's education level (scored 0= "less than a high school graduate;" 0.5= "high school graduate, vocational school, and/or some college;" and 1= "college graduate or higher") and employment status (scored 0= "not working," .5= "working part-time," and 1= "working full-time), father/male guardian's employment status (scored the same as mother's employment status), family structure (scored 0= "single parent," 0.5= "parent and stepparent or other adult," and 1= "two biological-parents"), whether the participant or any sibling receives a free or reduced cost lunch at school (0= "yes" and 1= "no"), and whether the family receives food stamps (0= "yes" and 1= "no"). Father's education level and familial welfare status were excluded due to extensive missing data. Participants with at least 70% of the items completed received a mean family SES score (M= .56; SD= .16).

Lastly, whether or not participants had access to SBHCs was controlled. Thirtyfive percent of participants (n=133) did not have access to an SBHC in their school. The health centers provide health-related information that may impact sexual initiation. As such, the effect of access to an SBHC in school on early sexual initiation was controlled. Data Preparation

Data Entry and Quality Assurance. All surveys were scanned and electronically compiled using Remark software. To verify the accuracy of scanning, the electronic data values were compared to the hard copies for 20 percent of all surveys. If participants inappropriately selected more than one response to a single-response item, then their data for that item was coded as missing. All data were then imported into SPSS for further cleaning. Frequencies were run on all items to identify any out of range values. None were identified. Discrepancies between Wave 1 and Wave 2 responses on demographic items (e.g., sex at Wave 1 was skipped and sex at Wave 2 was reported as female) were examined and resolved by accepting self-reports when one time point had missing data while the other did not and by coding data as missing if the two time point reports were irreconcilable (e.g., race/ethnicity at Wave 1 was reported as White but was reported as Latino at Wave 2). Consistent with the CHIP-AETM manual instructions, a scale score was only constructed for individuals who had completed at least 70% of the questions in a given scale. Across all scales, 98% of participants completed more than 70% of the requisite items, with no single item missing more than $\sim 15\%$ of responses.

Missing Data, Normality, and Outliers. All scales had less than 2% missing data. With only 2% of scale scores missing, the potential bias due to missing data is negligible. The missing data for the current study were handled through the use of full information

maximum likelihood estimation (FIML), which can accommodate up to 25% missing data while still producing accurate coefficient estimates and model fit indices (Enders & Bandalos, 2001).

Regarding the normality of the data, the distributional properties (i.e., skewness and kurtosis) of each scale or composite measure were examined. The problem behavior scale was extremely kurtotic. With the exception of scores indicating no problem behavior, the distribution was flat and wide; among participants who had engaged in problem behaviors, there was a high degree of variability in the extent of their problem behavior. A log transformation was applied to reduce the kurtosis (prior to transformation kurtosis was 3.554, after transformation kurtosis was 0.966). All other scales met normality assumptions.

To detect outliers, both univariate and multivariate detection methods were employed. Univariate outliers were indicated by individual scale scores greater than three standard deviations from the mean. Multivariate outliers were detected using Cook's Distance, Mahalanobis distance, and individual case leverage. Only cases that were indicated by at least two of the four detection methods were labeled potential outliers. Thirteen cases were flagged as multivariate and/or univariate outliers. Analyses were completed with and without the thirteen cases to determine whether these cases were outliers that should be removed from the dataset. The results did not change after excluding these cases, thus indicating that the cases were not exerting undue influence on the results and should be retained for analysis.

Determining the Appropriate Analytic Strategy. The data used in the current study included students nested within schools. In order to determine whether multilevel

modeling (MLM) was required to account for between school differences, the intra-class correlation (ICC) was computed by running the unconditional random intercept model using HLM version 6.02. Consistent with the recommendations of Snijders and Bosker (1999), the following equation was used to account for the dichotomous outcome (i.e., early sexual initiation):

ICC= intercept variance/[intercept variance + $(\pi^2/3)$]

The ICC for early sexual initiation was 0.00032 indicating that less than 1% of the variance in early sexual initiation was explained by between school differences. As such, MLM was not used as the analytic method for this study. Instead, the social contextual model of early sexual initiation was tested using path analysis, which allows for simultaneous testing of each model path. Mplus software was selected because of its ability to examine both continuous and categorical outcomes (Muthén & Muthén, 2007), which the more commonly used AMOS software cannot accommodate.

Power Analysis. Two types of power were assessed in the current study: the power to detect relationships among model variables and the power to detect model fit. The Power Analysis and Sample Software (PASS) for Windows was used to assess the power to detect individual relationships among model variables. Accounting for model complexity and sample size (both n = 378 and n = 316), these analyses have a power greater than .80 to detect small effects ($R^2 = .02$; Hitze, 2008). As such, this study was adequately powered to detect relationships among model variables.

MacCallum, Browne, and Sugawara (1996) detail a method of assessing a study's power to detect model fit (i.e., RMSEA). Studies with few degrees of freedom and modest sample sizes such as this one typically lack the power to appropriately reject the null hypothesis of a close fitting model. The final model of this study had 17 degrees of freedom. Given the sample size, this results in a power level of approximately .67 (MacCallum, Browne, & Sagawara, 1996), below the minimum recommended power of .80 (Cohen, 1988). This suggests that there was a 33% chance that the model would be considered a close fit of the data when in fact it was not. The model fitting process is described in greater detail in the next section. The implications of this limitation are presented in the discussion section.
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RESULTS

To review, the current study tested the social contextual model of early sexual initiation. Parental connectedness was modeled as a primary predictor influencing peer associations, school connectedness, problem behaviors, and early sexual initiation. In addition, deviant peers and school connectedness were hypothesized to directly predict problem behaviors and partially mediate the relationship between parental connectedness and problem behaviors. Similarly, deviant peers, school connectedness, and problem behaviors were hypothesized to both directly predict early sexual initiation and partially mediate the relationship between parental connectedness and early sexual initiation. In addition, exploratory analyses were completed to test whether the model relationships were different for boys and girls.

In the results that follow, I will begin by presenting a description of the pattern of early sexual initiation among the virgins at Wave 1. Second, I will present the results of the model fitting process. Third, I will review the results of the preliminary bivariate analyses and the tests of unconditional and conditional direct relationships. Fourth, I will present the tests of indirect and mediation effects. I will conclude with a summary of the results.

Pattern of Early Sexual Initiation

By Wave 2, 85 high school students (23%) initiated sexual activity. Table 2 presents the demographic information for the students who debuted sexually and those who did not. Overall, the virgins and non-virgins at Wave 2 were demographically very similar. Sexual initiation was equally likely to occur for boys and girls $[\chi^2(1) = .19, p >$

.05], across all racial groups $[\chi^2(3) = 2.36, p > .05]$, and for those who did and did not receive free/reduced-price lunches $[\chi^2(1) = .70, p > .05]$.

Demographic	Virgins at Wave 2	Non-Virgins at	Total
Characteristics	(n = 231)	Wave 2	
		(n = 85)	
Sex			
Male	74% (n = 96)	26% (n = 33)	n = 129
Female	72% (n =135)	28% (n = 52)	n = 187
Race/Ethnicity			
White	69% (n = 93)	29% (n = 39)	n = 134
African American	72% (n = 78)	26% (n = 28)	n = 109
Latino	81% (n = 42)	19% (n = 10)	n = 52
Asian American	67% (n = 2)	33% (n = 1)	n = 3
Native American	50% (n = 1)	50% (n = 1)	n = 2
"Other"	70% (n = 14)	30% (n = 6)	n = 20
Free/Reduced-Price	71% (n = 139)	29% (n = 56)	n = 195
Lunch			

 Table 2. Demographic Characteristics of Virgins and Non-Virgins at Wave 2

*All percentages are based on valid percents; due to rounding, the sample percentages may not sum to 100. Model Fitting Process

The hypothesized relationships of the social contextual model of early sexual initiation were estimated using path analysis. In order to establish a baseline model and model fit indices, all paths of the social contextual model and all possible paths among

the main model variables and the control variables (i.e., a nearly saturated model) were estimated using FIML via Mplus software.

The fit indices examined included the chi-square statistic (CMIN), the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), and the Comparative Fit Index (CFI; Bentler, 1990). The CMIN tests how well the researchergenerated model's covariance structure replicates the observed data's covariance structure. A non-significant chi-square indicates good fit such that the hypothesized model is not significantly different from the observed data. Because the CMIN is conservative, influenced by sample size, and prone to Type II errors, a significant chisquare alone was not deemed cause for modifying the hypothesized model. The RMSEA and CFI provide balanced insight into the overall model fit in conjunction with the CMIN. The RMSEA uses the model chi-square value while accounting for model complexity (i.e., degrees of freedom). It is less susceptible to sample size changes. An RMSEA value less than or equal to .06 indicates good fit. Lastly, the CFI compares the fit of the hypothesized model to the fit of a model that assumes all variables are uncorrelated (i.e., the null or independence model). Adequate fit is indicated by a CFI value greater than .95.

After establishing baseline model fit, pathway estimates were examined to determine which non-significant paths should be set to zero in order to create the most parsimonious, well-fitting model. Non-significant relationships among the core predictor variables (i.e., parental connectedness, school connectedness, deviant peers, and problem behavior) and each control variable (i.e., SES, health center status, and race/ethnicity) were constrained to zero in sets. All of the non-significant paths between the predictor

variables and SES were trimmed first, followed by the trimming of non-significant health center status and race paths in the subsequent models. Table 3 presents the zero-order correlation matrix for reference.

In each step of the model trimming process, the change in model fit was examined by requesting the derivatives of the unconstrained model and comparing those to the constrained model via the "DIFFTEST" procedure in Mplus. A traditional chi-square difference test could not be used because the chi-square difference is not chi-square distributed for the estimators applied in these analyses (i.e., WLSMV, a robust weighted least squares estimator that performs probit regression for the binary early sexual initiation outcome; Muthen & Muthen, 1998-2007). The DIFFTEST procedure developed by the creators of Mplus accounts for this problem and allows for a comparison of nested models. A non-significant chi-square for difference testing indicates that the constrained model does not significantly worsen model fit. Lastly, modification indices were examined to assess local fit. Pathways with the potential to meaningfully improve the model were considered for addition.

Table 3. Zero-Order Correlati	suo						
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Problem Behaviors	1						
Peers	.414**	1					
Parental Connectedness	275**1	**761	1				

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School Connectedness	307**	226**	.271**	1		
Early Sexual Initiation	.246**	.292**	100	102	1	
Health Center	.069	.055	.035	022	.110*	1
African American	029	004	.044	.054	005	.141**

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-.117*

.057

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"Other"

SES

Latino

.129* -.353**

-.057

-.032

.036

.002

-.047

* Correlation is significant at the 0.05 level (2-tailed).

A series of four nested models were tested to identify the final, best fitting model. Table 4 presents the fit statistics for each model that trimmed non-significant paths between the covariates and primary variables.

Model	Chi-square	RMSEA	CFI	Chi-square for
	(df)			difference testing
Baseline	14.731 (1);	0.191	0.902	
	<i>p</i> < .01			
SES paths trimmed	10.812 (4);	0.067	0.952	0.897 (3);
	<i>p</i> = 0.03			<i>p</i> = 0.83
Health Center paths	15.520 (8);	0.050	0.947	3.162 (3);
trimmed	<i>p</i> = 0.05			<i>p</i> = 0.37
Race paths trimmed	21.096 (17);	0.025	0.971	8.380 (10);
(final model)	<i>p</i> = 0.22			<i>p</i> = 0.59

 Table 4. Model Fit Statistics

Only two paths between covariates and primary model variables were statistically significant and retained in the final model: SES was significantly related to school connectedness, and health center status was significantly related to early sexual initiation. Race was not significantly related to any of the model variables. All non-significant pathways were set to zero. Examination of the modification indices revealed no pathways that would significantly improve model fit. The final model fit indices (presented in the last row of Table 4) met the criteria for a well-fitting model.

In the final model, participants with higher SES reported higher school

connectedness ($\beta = 0.33$, p < .05), and participants attending a school with a health center were more likely to engage in early sexual initiation ($\beta = 0.38$, p < .05). This finding was expected given that one indicator of SES was parents' educational attainment. Parents with greater educational attainment presumably would be better able to foster their child's school connectedness compared to parents who were less successful themselves in school. The health center effect was also not surprising. Health centers were instituted in areas with the greatest health needs, which included concerns about adolescent sexual health. Furthermore, these data were collected in the beginning of students' exposure to the health center; therefore, any positive effects the centers may have on sexual behavior would not be evident yet.

In addition to establishing overall model fit, sex differences were also examined by comparing two nested models. No hypotheses were offered regarding sex differences; however, consistent with existing literature, gender differences were tested. First, all pathways in the final model were allowed to vary by sex. Second, all pathways were constrained to be equal across boys and girls. A chi-square difference test was used to determine which model best fit the data. A lack of significant change in model fit between the constrained and unconstrained models indicated that there was no significant difference between boys and girls on the modeled relationships (Table 5). As such, the results presented reflect the entire sample.

Model	Chi-square	RMSEA	CFI	Chi-square for
	(df)			difference testing
Allowed to Vary by Sex	35.640 (32);	0.025	0.972	
	<i>p</i> = .30			
Constrained across Sex	45.065 (38);	0.031	0.946	14.174 (9);
	<i>p</i> = .20			<i>p</i> = .12

Table 5. Model Fit Statistics Testing Sex Differences

Bivariate and Direct Relationships among Model Variables

The direct relationships among model variables were tested in three ways. First, partial correlations were examined. Second, the paths to problem behavior and early sexual initiation were modeled separately (i.e., unconditional relationships) in Mplus. This approach was consistent with past research that treated predictors as independent. These tests of the unconditional parental connectedness-problem behavior and parental connectedness-early sexual initiation relationships also indicated whether deviant peers, school connectedness, and problem behaviors should be tested as mediators or indirect effects. Third, the paths to problem behavior and early sexual initiation were modeled simultaneously (i.e., conditional relationships). This approach accounts for the interdependencies (covariance) among model variables.

Partial correlations among the primary model variables were generated after controlling for health center status, race, and SES (Table 6). It was expected that parental connectedness would be positively associated with school connectedness and negatively related to deviant peers, problem behavior, and early sexual initiation. It was also expected that deviant peers would be positively associated with problem behaviors and early sexual initiation, school connectedness would be negatively associated with problem behaviors and early sexual initiation, and problem behaviors would be positively associated with early sexual initiation. All of the relationships were significant in the expected direction except for two: the parental connectedness- and school connectednessearly sexual initiation relationships approached traditional significance (r = -.10, p = .09and r = -.10, p = .07).

	1	2	3	4	5
Problem Behaviors	1.00				
Deviant Peers	.44**	1.00			
Parental Connectedness	26**	19**	1.00		
School Connectedness	27**	17**	.31**	1.00	
Early Sexual Initiation	.23**	.28**	10 ^t	10 ^t	1.00

Table 6. Partial Correlations between Model Variables

p < .001; p < .10

Next, the direct, unconditional relationships between parental connectedness, deviant peers, and school connectedness and problem behaviors and early sexual initiation were tested. Each direct relationship was modeled separately using Mplus. The significant covariates identified in the overall model fitting process were retained in each model. All coefficients presented in text are standardized (i.e., transformed to be on the same metric). Unstandardized coefficients, standard errors, and confidence intervals are presented in Table 7. Mplus was limited to probit regression when testing direct and indirect effects with bootstrapping. In order to make those results more interpretable, any significant associations were converted to the logit metric by multiplying the unstandardized coefficients by 1.6 (Amemiya, 1981). That value was then exponentiated so that the results could be discussed in terms of odds ratios (OR).

Parental connectedness, deviant peers, and school connectedness were all significantly related to problem behaviors. Adolescents with less parental and school connectedness engaged in more problem behaviors ($\beta = -0.28$, p < .05; $\beta = -0.31$, p < .05, respectively), and adolescents with more deviant peer associations engaged in more problem behaviors ($\beta = 0.41$, p < .05). Only deviant peer associations and problem behaviors were directly related to early sexual initiation ($\beta = 0.35$, p < .05; $\beta = 0.29$, p < .05). Participants with a one unit higher deviant peers score had three times greater odds of debuting sexually (OR = 3.22), and a one unit higher score on problem behaviors was associated with nearly eight times greater odds that a student would debut sexually (OR = 7.83). Neither parental connectedness nor school connectedness were significantly related to early sexual initiation ($\beta = -0.12$, ns; $\beta = -0.13$, ns), respectively].

When the relationships were modeled simultaneously (i.e., when the full model was tested), all of the previously significant associations remained significant. This model accounted for 26% of the variance in problem behaviors and 18% of the variance in early sexual initiation. Table 7 presents the standardized and unstandardized unconditional and conditional model coefficients. All of the coefficients decreased from the unconditional to the conditional model. This is an expected result of modeling joint effects of correlated variables (i.e., some of their explanatory relationships with problem behavior and early sexual initiation overlap). The odds of early sexual initiation occurring were two and a half times greater for every unit higher score on deviant peers in the conditional model (OR = 2.57 compared to 3.22 in the unconditional model) and three

		JV: Problem Beh	lavior		DV: Early Sexua	al Initiation	
	β	B (SE)	95% CI	β	B (SE)	95% CI	OR
Parental Connectedness							
Unconditional Model	28	07* (.01)	09 to04	12	13 (.07)	27 to .01	
Conditional Model	-11	03* (.01)	05 to002	.01	.02 (.08)	15 to .18	
Deviant Peers							
Unconditional Model	.41	.19* (.02)	.15 to .24	.35	.73* (.13)	.47 to .98	3.22
Conditional Model	.37	.17* (.02)	.13 to .22	.28	.59* (.16)	.28 to.89	2.57
School Connectedness							
Unconditional Model	31	15* (.02)	20 to10	13	29 (.16)	60 to .03	
Conditional Model	24	12* (.02)	16 to07	07	14 (.17)	48 to .20	
Problem Behaviors							
Unconditional Model	n/a	n/a	n/a	.29	1.29* (.28)	.74 to 1.84	7.83
Conditional Model		n/a	n/a	.16	.70* (.35)	.01 to 1.38	3.06
							l

Table 7. Standardized Unconditional and Conditional Model Coefficients

* *p* < .05

times greater per additional unit on problem behavior (OR = 3.06 compared to 7.83 in the unconditional model).

The full model also revealed that, after accounting for all other modeled variables, parental connectedness was significantly related to both school connectedness and deviant peers. Higher levels of parental connectedness were associated with higher levels of school connectedness ($\beta = 0.33$, p < .05), and lower levels of parental connectedness were associated with higher levels of deviant peer associations ($\beta = -0.26$, p < .05). Figure 2 presents the standardized coefficients for the significant pathways obtained from the test of the final model.

Figure 2. Statistically Significant Pathways of the Social Contextual Model of Early Sexual Initiation



Mediation and Indirect Relationships

The current study hypothesized five partial mediation pathways. As recommended by Mackinnon et al. (2007) and Preacher and Hayes (2008), the current study used the product of coefficients method to test and interpret two sets of multiple mediators. Mplus was used to estimate the indirect effects of the IV on the DV via the mediator variables, and the statistical significance of these pathways was determined through the bootstrap procedure. Bootstrapping, a nonparametric resampling approach, was employed due to its greater power relative to parametric approaches. It is also more appropriate given the non-normal distributions of indirect effects (Preacher & Hayes, 2008).

For mediation to be present, the independent variable must be related to all of the mediator variables, and the mediator variables must be related to the dependent variable after controlling for the independent variable. Finally, there must be a significant unconditional direct effect of the IV on the DV. If the unconditional direct effect is not present, then one can test for and interpret indirect effects only, not mediated effects.

If mediation is present, then the final step is to determine whether the mediators partially or fully explain the relationship of interest. With multiple mediation, the mediators must be considered as a set and as specific mediated effects (i.e., individual mediation pathways). The set of mediators fully mediates the IV-DV relationship if the conditional direct effect is not significant. If the conditional direct effect is significant, then the set of variables reflect partial mediation (MacKinnon, 2008). There are two considerations regarding the specific mediated effects. First, if there is more than one significant specific mediated effect in the model, then all significant pathways reflect partial mediation. Alternatively, if only one pathway is significant and the conditional direct pathway is significant, then that pathway reflects partial mediation. If the conditional direct pathway is non-significant, then the mediator variable fully mediates the IV-DV relationship.

It was hypothesized that deviant peers and school connectedness would partially mediate the relationship between parental connectedness and problem behaviors. In addition, it was hypothesized that deviant peers, school connectedness, and problem behaviors would partially mediate the relationship between parental connectedness and early sexual initiation. Table 8 presents the findings for the indirect effects.

Pathway	Mediation or	Estimate	95% Confidence
	Indirect Effect		Interval
Hypothesized Pathways			
$PC \rightarrow Peers \rightarrow PB$	Partial Mediation	-0.023 *	-0.037 to -0.008
$PC \rightarrow SC \rightarrow PB$	Partial Mediation	-0.019 *	-0.032 to -0.006
$PC \rightarrow PB \rightarrow ESI$	Indirect Effect	-0.019	-0.050 to 0.013
$PC \rightarrow Peers \rightarrow ESI$	Indirect Effect	-0.078 *	-0.137 to -0.019
$PC \rightarrow Peers \rightarrow PB \rightarrow ESI$	Indirect Effect	-0.016	-0.036 to 0.004
PC → SC →ESI	Indirect Effect	-0.023	-0.085 to 0.039
$PC \rightarrow SC \rightarrow PB \rightarrow ESI$	Indirect Effect	-0.013	-0.030 to 0.003
Exploratory Pathway			
$SC \rightarrow PB \rightarrow ESI$	Indirect Effect	-0.081 ^t	-0.173 to 0.011

PC = Parental Connectedness, Peers = Deviant Peers, PB = Problem Behavior, SC = School Connectedness, ESI = Early Sexual Initiation, * p < .05, ${}^{t}p < .10$

As already reported, a significant unconditional relationship was observed between parental connectedness and problem behaviors. As such, deviant peers and school connectedness were tested as mediators of that relationship. The parental connectedness-problem behaviors relationship remained significant when the mediators were added to the model ($\beta = -0.11, p < .05$). This indicated that, as a set, deviant peers and school connectedness partially mediated the parental connectedness-problem behaviors relationship. Individually, deviant peers and school connectedness partially explained the relationship between parental connectedness and problem behaviors ($\beta = -$ 0.09, p < .05; $\beta = -0.08, p < .05$, respectively). In other words, the influence of parental connectedness on adolescents' problem behaviors was in part due to lower school connectedness and more deviant peer associations.

No significant unconditional relationship between parental connectedness and early sexual initiation was detected. Therefore, only indirect effects were examined. A significant indirect effect was found whereby parental connectedness indirectly affects early sexual initiation through the influence on deviant peer associations ($\beta = -0.07$, p <.05); less parental connectedness was associated with more deviant peer associations, which in turn was associated with a higher likelihood of early sexual initiation. Contrary to the hypotheses, no indirect effect of parental connectedness on early sexual initiation was found through school connectedness ($\beta = -0.02$, *ns*) or problem behaviors ($\beta = -0.02$, *ns*).

To better understand the role of school connectedness in early sexual initiation, exploratory analyses were undertaken that examined whether school connectedness indirectly affected early sexual initiation through problem behaviors. This effect approached traditional significance ($\beta = -0.04$, p < .10). This suggests that less school connectedness was associated with more problem behaviors which ultimately were associated with a greater likelihood of engaging in early sexual initiation.

To summarize, the social contextual model of early sexual initiation was only partially upheld by the current study. All of the hypothesized pathways to problem behavior were supported: parental connectedness, deviant peers, and school connectedness were directly related to problem behaviors and deviant peers and school connectedness both partially mediated the parental connectedness-problem behaviors relationship. On the contrary, the majority of the hypothesized relationships regarding early sexual initiation were not upheld. Only deviant peers and problem behaviors were directly related to early sexual initiation. In addition, weak parental connectedness indirectly affected early sexual initiation through deviant peers. Lastly, lack of school connectedness tended to indirectly increase the likelihood of early sexual initiation through problem behaviors. Neither parental connectedness nor school connectedness were directly related to early sexual initiation. Similarly, school connectedness and problem behaviors did not explain the relationship between parental connectedness and early sexual initiation as hypothesized.

DISCUSSION

Early sexual initiation has been associated with several negative sexual health outcomes such as STIs and unwanted pregnancy. Successful prevention efforts need to target factors that lead to early sexual initiation. The extant literature highlights the importance of the social context for understanding adolescent sexual behavior. However, much of this research has been limited by cross-sectional designs, samples spanning developmentally distinct ages, over-reliance on univariate analysis, and a lack of multisystemic, ecologically-oriented frameworks. Taken together, these limitations result in prior research painting an unfinished portrait of early sexual initiation.

The current study expanded upon prior research by prospectively examining sexual initiation from an ecological perspective. Sexual initiation between ages 14 and 15 years was predicted from parent, peer, school, and individual behavior variables. Both direct and indirect effects were tested allowing the detection of more complex, mechanistic relationships among key social contextual influences on adolescent behavior.

In this sample, approximately one-quarter of adolescents debuted sexually between ninth and tenth grade. An additional 136 students in the overall high school sample initiated sexual activity prior to baseline data collection. Collectively, 42% of high school students in this sample debuted early. This high rate of early sexual initiation underscores the importance of attending to this social issue.

The proportion of students initiating early in this sample is roughly double what was found in several nationally representative studies of adolescent sexual initiation (i.e., between 18% and 20%; Bruckner & Berman, 2003; CDC, 2008; Terry-Humen &

Manlove, 2003). This divergence in overall observed initiation rates may be due to the age used to delineate "early" debut in past research. In the nationally representative studies, early sexual debut was reported for initiators younger than 15 years of age. The current study *included* age 15. Given that these data were drawn from a study that followed a cohort of ninth grade students for 1 year, students on average were 15 years old by the second time point. Zimmer-Gembeck and Helfand's (2008) literature review validates the inclusion of 15-year-olds as early sexual initiators. Their in depth review of the longitudinal research indicated that age 16 marks the shift to a more typical age of debut.

The rate of debut among participants in this sample prior to the start of the study was similar to the nationally representative studies, only slightly higher (i.e., 26%). The roughly doubled rate of initiation during the transition from ninth to tenth grade suggests that age 15 may represent a tipping point in early sexual initiation. Additional research should attend to whether there are defined sub-groups among early initiators, (e.g., a group that initiates prior to entering high school and a group that initiates in early high school). It seems likely that the developmental trajectories and other characteristics of adolescents who initiate early in high school will differ in a defining way from adolescents who initiate while in middle school or earlier.

The demographic characteristics of sexual initiators in this sample lend preliminary support to the notion of early initiation subgroups. Specifically, whereas past research has tended to find that boys and African American youth initiate earlier than other adolescents (e.g., Abma et al., 2004; CDC, 2008; Terry-Humen & Manlove, 2003; Zimmer-Gembeck & Helfand, 2008), boys and girls were equally likely to initiate sexual

activity between ninth and tenth grade in this sample, as were adolescents who identified with each of the different racial/ethnic groups. Similarly, there were no differences by sex in the relationships among the predictors and early sexual initiation, and race/ethnicity was not a significant control variable. However, examination of the demographic characteristics of adolescents who debuted sexually prior to baseline data collection revealed that they were more likely to be African American and male. This pattern of findings may reflect unique processes at work that result in different ages of early sexual initiation: cultural processes influencing initiation occurring in middle school or earlier compared to more general developmental processes influencing initiation occurring in early high school. Additional research is needed to understand the underlying causes of such differences.

The intra-class correlation obtained from these nested data indicated that less than 1% of the variance in early sexual initiation was accounted for by differences between the schools from which this sample was drawn. Rather than patterns of sexual initiation being unique to a particular school or community context, this finding suggests that rates of sexual debut instead are more a feature of developmental processes specific to youth who are 14 to 15 years old. This lends support for generalizing the findings of this study to the greater adolescent population of the same age.

The social contextual model of early sexual initiation proposed in the current study modeled parental connectedness, deviant peers, and school connectedness predicting two outcomes: general problem behaviors and early sexual initiation. The model was only partially upheld. The portion of the model that terminated in problem behaviors performed as predicted; consistent with problem behavior theory and other

social influence theories (e.g., Jessor, 1987; L'Engle & Jackson, 2008; Scaramella et al., 1998), parental and school connectedness inversely predicted problem behaviors, while deviant peers was positively related to problem behaviors. In addition, deviant peer associations and school connectedness partially explained the parental connectedness-problem behavior relationship. Given the extensive empirical validation of problem behavior theory over 3 decades and across cultures (e.g., Jessor, 2008; Vazsonyi et al., 2008), these findings are not surprising. However, the hypothesized relationships between the predictor variables and early sexual initiation in general were not supported.

In these data, deviant peer associations and problem behaviors were directly related to early sexual initiation; having more deviant friends and engaging in more problem behaviors in grade nine increased the likelihood of sexual initiation by grade ten. These results are consistent with past research on the deviant peer-early sexual initiation and problem behavior-early sexual initiation associations (for reviews see Buhi & Goodson, 2007; Goodson et al., 1997; Kirby, 2002a; Kotchick et al., 2001; Miller et al., 2001; Smith et al., 2005; Zimmer-Gembeck & Helfand, 2008) and highlight the powerful role peers and previous problem behaviors play in shaping future adolescent behavior. Deviant peer groups may offer social norms that are accepting of early sexual behavior as well as opportunities for identifying like-minded sexual partners. Collectively, these peer group characteristics set the stage for early sexual debut. Similarly, engaging in other socially unconventional and unacceptable behaviors seems to pave the way for adding sexual experimentation to one's repertoire of problem behavior.

Parental connectedness was not directly related to early sexual debut. This finding is consistent with the longitudinal research that suggests a weak or non-significant direct

parental connectedness-early sexual relationship (Zimmer-Gembeck & Helfand, 2008). Parental connectedness was, however, linked to early sexual initiation indirectly through deviant peer associations. This finding reinforces the recommendation by Zimmer-Gembeck and Helfand (2008) that future research should model parental connectedness as a distal predictor of adolescent sexual behavior rather than a proximal, direct predictor.

The indirect parental connectedness effect indicates that positive connections to parents may be protective against early sexual initiation via their effect on peer associations. Stronger parental connectedness may decrease adolescents associations with deviant peers; without the influence of deviant peers, the odds of engaging in early sexual initiation decrease. Put another way, these results suggest that weak parental connectedness may act as a catalyst on the pathway toward early sexual initiation. As described by social influence and problem behavior theories, the lack of parental involvement and support may lead adolescents to be more open to the values and behaviors of their peer group. Without early parental involvement, adolescents who associate with deviant peers are therefore more likely to engage in the behaviors of that group, including initiating sexual activity.

The social contextual model of early sexual initiation also tested the influence of school connectedness on early sexual initiation. Sexual initiation research has paid only limited attention to school-related variables, typically examining only academic performance (e.g., Kirby, 2002; Smith et al., 2005; Zimmer-Gembeck & Helfand, 2008). The focus on academic performance is founded on the notion that students who are more academically engaged have a greater future orientation and are therefore less likely to engage in behaviors that may jeopardize their future (e.g., Kirby, 2002b; Zimmer-

Gembeck & Helfand, 2008) or that the cost-benefit ratio of risky behavior leads academically engaged students to not partake in problem behaviors (Schvaneveldt et al., 2001). However, schools' potential influence on adolescent behavior is much greater than merely affecting the engaged academic performers. Building off of problem behavior theory (e.g., Jessor, 1987; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995), the findings of L'Engle and Jackson (2008), and Kirby (2002b), the current study employed a broader conceptualization of schools; in addition to attending to traditional academic engagement, the current study sought to account for the influence of the school context as a setting that can structure adolescents' free time (e.g., providing them sports, extracurricular activities), provide supportive adult role models in faculty and staff, and instill pro-social values.

Contrary to the hypotheses, school connectedness neither directly predicted early sexual initiation nor did it mediate the relationship between parental connectedness and early sexual initiation. However, although not traditionally significant, school connectedness was indirectly related to early sexual initiation through problem behaviors. With a weaker connection to school, the potential for the school context to positively influence adolescent behavior was limited. As such, some adolescents were left more psychosocially vulnerable to engaging in problem behaviors, which ultimately increased their odds of early sexual initiation by tenth grade. However, given the lack of traditionally significant findings, additional research is needed before strong statements can be made regarding the role of school connectedness in predicting early sexual initiation. At a minimum, the findings of the current study indicate that school connectedness warrants inclusion in future research on early sexual initiation.

The current study modeled the relationships among predictors both independently (i.e., in separate models) and simultaneously (i.e., in a single, comprehensive model) in order to compare the findings with the current sample. The separate models examined direct unconditional effects, and the comprehensive model tested both direct conditional effects and indirect effects. Interestingly, the direct effect findings did not differ dramatically; all significant relationships found in the separate models remained so in the comprehensive model. However, all of the standardized coefficients decreased in value, and the odds ratio for problem behavior decreased by approximately one-half. This decrease in value is expected and attributable to an overlap in the variance explained by correlated predictor variables.

The major difference in findings between the independent models and the comprehensive model lies with the indirect effects. Had this study followed the analytic methods of the vast majority of prior research, one might erroneously conclude that parental and school connectedness are irrelevant to early sexual initiation. Examination of indirect effects revealed the value of including both connectedness constructs in studies of early sexual initiation. Furthermore, the indirect effects offered new insights into the well-documented influence of peers in the development of early sexual initiation, namely that peers provide the sole link (in this model) between parental connectedness and early sexual initiation. Such insights and improved understanding of the dynamics underlying the developmental trajectories leading to early sexual initiation would be lost without the use of more sophisticated modeling techniques. Overall, the current research lends strong support for the application of more multivariate, structural modeling techniques to the study of early sexual initiation.

These findings should be considered in light of this study's limitations. As is often the case in social science research, the current study is limited by the use of self-report data. It is entirely possible that students did not accurately report their individual behavior, peer behavior, or parental and school-based relationships. For example, participants may not honestly report their sexual status and other problem behaviors for a variety of reasons. Some students may dishonestly claim virginity or non-virginity status, regular substance use or none, depending on the perceived social desirability of the different behaviors (Brener, Billy, & Grady, 2003).

To determine the veracity of self-reports, researchers ideally obtain additional data such as biochemical markers to confirm substance use or information about sexual partners for verification. Such efforts are both expensive and ethically challenging with an adolescent population. In the current study, no external verification data were collected. As such, it is impossible to determine the extent of reporting inaccuracies. However, there are methodological considerations that can create the circumstances under which adolescents are more apt to provide accurate responses. In a review of the research on adolescent self-report data, Brener, Billy, & Grady (2003) surmised that self-administered surveys, such as the one used to collect the data in the current study, create the best circumstances for obtaining honest, accurate self-report data. In addition, the methods employed in the current study are consistent with those of previous work in this field. The application of similar methods allows for comparison of findings across studies in the field. The overall consistency of the current study's findings with past research suggests the results are as accurate as the body of work on early sexual initiation.

Although this study improves on past work by utilizing longitudinal data, the data only included two time points. In addition, the primary predictor variables were all measured at a single time point. This hampers the ability to make causal statements about the indirect effects and, in general, limits our understanding of the temporal relationship of the social contextual influences on sexual initiation. For example, it seems logical to assume that poor parental and school connectedness emerge gradually over time, and that they would similarly gradually influence deviant peer associations and engagement in problem behaviors. It is possible that many of the modeled variables are time-varying covariates. Furthermore, the influence of parental behaviors on adolescent behaviors may be greater earlier in development when parents serve as the primary socializing agents. As such, the measured behavioral indicators of parental connectedness may be more relevant in the overall model if they were observed earlier in development. Testing the nature of these associations beginning earlier in development and continuing over time would provide important insights for informing effective prevention/intervention efforts. Nonetheless, the current study improves upon the primarily cross-sectional body of extant research and contributes to our understanding of the temporal ordering of the set of social contextual factors examined as predictors of early sexual initiation.

This study was also limited by the use of secondary data. The original measures were not designed with the current research in mind. As such, the measures do not all capture the constructs as well as they would have were the study designed anew. Of particular noteworthiness are the parental connectedness and sexual behavior measures. Parental connectedness is indicated by parental involvement; perceived closeness and warmth; feeling understood, loved, and wanted; and overall adolescent satisfaction with

the parental relationship. The current 5-item measure of parental connectedness was derived from a well-validated measure or familial involvement, and the items in this measure reflect parental involvement (i.e., "spent time with you doing something fun" and "ate meals with you"), feeling understood (i.e., "talked with you or listened to your opinions or ideas"), and satisfaction with the relationship (i.e., "liked being a member of your family"). The final item that refers to "getting along" more broadly represents connectedness (i.e., if the family does not get along it is likely there is a lack of parental connectedness). As indicated in the literature review, the role of parents in adolescent development is complex and much more multifaceted than the current study's measure captured. Despite its general alignment with the construct, a stronger measure would include multiple items to address each element of parental connectedness. Nonetheless, this limited measure performed consistent with past longitudinal research findings, lending further support for the adequacy of the measure. However, a more refined instrument would increase the confidence in the observed relationships.

The measure of sexual initiation employed in this study provided only the most basic information regarding sexual debut; no insights were possible regarding the context of early sexual initiation. Understanding, for example, who adolescents initiate with (e.g., age of their partners, whether they were in a relationship), where they initiate (e.g., at a house without parental supervision), and whether the sex was consensual would inform the interpretation of the data obtained and the prevention efforts employed to curb such behaviors. Furthermore, this measure failed to address behaviors such as oral and anal sex or differentiate between heterosexual behavior and homosexual behavior. Much of the existing research on early sexual initiation offers equally limited insights into the

context of early sexual debut and focuses broadly on sexual intercourse. Such limited measures of sexual behavior are often used in response to the concerns of the settings in which this research is conducted. Sexual behavior research involving direct contact with minors is often inhibited by schools' fears of parental reaction to such information being gathered. Schools expressed reservations about the few sexual behavior questions included in the broader study from which these data were drawn, with one high school opting out of those questions all together. Discussions with parents and school staff prior to the inception of sexual health studies may improve the receptiveness of schools and parents to the gathering of sexual behavior data. Overall, more refined measurement is needed if we hope to improve our understanding of adolescent sexual behaviors.

Overall, this model accounted for only 18% of the variance in early sexual initiation. Given that this study analyzed pre-existing data, the model was constrained by the items assessed in the original survey. However, the extant literature points to several individual and parental variables that may account for the remaining 82% of the variance in early sexual initiation, including pubertal status, physical maturation, attitudes toward premarital sex, sexual behaviors previously engaged in, romantic relationship status, religiosity, parental monitoring, and parental attitudes about sexual behavior (see Kirby & Lepore, 2007). Future research should consider including additional individual and parental level variables in order to better account for variance in early sexual initiation.

The sampling strategy employed in this study also limits the generalizability of the findings across adolescents. Specifically, participants in this study were sampled exclusively from schools. The sampled adolescents tended to engage in low levels of problem behaviors (on a scale of 1 to 5, mode = 1 and median = 1.24), be generally

connected to their parents (on a scale of 1 to 5, M = 3.67, SD = .98), and have few deviant peer associations (on a scale of 1 to 4, M = 1.50, SD = .49). Students who were not accessible through school-based sampling, such as high school drop outs, are likely to engage in more negative behaviors and be less connected than was found among the adolescents sampled in this study. As such, this sample was inherently biased toward adolescents who have greater psychosocial resources to support positive development.

It seems reasonable to expect that this model would not be upheld among a sample of adolescents who are not in school. In particular, the school connectedness construct would not be applicable, and one would expect that there would be less variability on all other model constructs (e.g., one would expect high school drop outs to have similarly high levels of deviant peers and problem behaviors as well as poor parental connectedness). Future research would benefit from employing community-based sampling strategies to better understand the pattern and predictors of sexual initiation among high school drop outs. Alternatively, combining school-based and community-based sampling techniques would offer an opportunity to examine the entire adolescent population, rather than a limited subset.

As previously described, the power to detect model fit for this study was limited. Although power was below the recommended level of .80, the power to reject the null hypothesis of close fit was better than chance (i.e., .67). In addition, the RMSEA obtained for the final model was quite small (.025), suggesting little discrepancy between the model and the data. Therefore, while a larger sample size would have provided a more definitive test of model fit, the RMSEA and other model fit indices strongly suggest that the model is a good fit to the data. It is also worth noting that fit indices are not obtained

for non-structural regression analyses (e.g., logistic regression, hierarchical regression), which are applied almost exclusively in the existing literature. As such, this limitation does not diminish the value of the findings relative to the prior research in this field.

Finally, 62 participants' sexual status could not be determined due to missing sexual behavior data at Time 2. This resulted in a sample size reduction for the prediction of early sexual initiation. Although the power was adequate to detect effects, the findings may have changed had those youth been included in the sample.

Despite these limitations, findings from the current study provide some guidance for intervention and prevention specialists. Specifically, decreasing early sexual initiation rates does not necessarily require directly targeting the adolescents' sexual behaviors. Strategies that foster parental connectedness and school connectedness more generally should be adopted. The current study suggests that isolating and addressing barriers to parental involvement and support may have a ripple effect on adolescent associations with deviant peers, problem behaviors, and ultimately their sexual behavior. Promoting school connectedness may reduce the opportunity and desire to engage in problem behaviors and early sexual initiation. Providing attractive spaces/events for adolescents to congregate at during their free time would also limit the opportunity for engaging in early sexual initiation. Given the developmental importance of each of these social systems, any efforts to promote positive family, school, and peer ties are likely to result in overall improved developmental outcomes, including sexual health.

In summary, findings from this study affirm the important role social context plays in shaping adolescent sexual behavior, particularly parents, peers, and to a lesser extent schools. Additional longitudinal research is needed to better understand the causal

links among these influences. Future research should continue to treat parental factors as distal predictors, as recommended by Zimmer-Gembeck & Helfand (2008). The understudied school connectedness construct also shows promise for inclusion in future models of early sexual initiation. Lastly, the current findings highlight the importance of employing more sophisticated analytic techniques that examine both direct and indirect relationships among variables.

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APPENDIX A:

PARENTAL CONSENT AND CHILD ASSENT FORMS

Michigan Evaluation of School-Based Health (MESH) PARENTAL CONSENT FORM

WHY IS THIS RESEARCH BEING DONE AND WHAT WILL HAPPEN IF I PARTICIPATE?

Researchers at Michigan State University are conducting research on the health of children in Michigan schools. The purpose of this study is to learn whether children who attend schools with school-based health centers enjoy better health and lower health care costs than children who attend schools without health centers. The findings from this study will increase knowledge about effective and efficient ways of providing health care services to school-aged children. The findings may also be used by policymakers to decide whether to fund additional school-based health centers. You and your child are being asked to participate in this study because he or she attends middle or high school that has been selected to take part in this study.

We are asking parents to fill out a 15-minute survey twice: once in the spring of 2007 and a second time in the spring of 2009. Each time parents fill out a survey they will receive a \$5.00 gift card. The parent survey contains questions about the health of their children and the health care their children have received.

We are asking children to fill out a 45-minute health survey called the Child Health and Illness Profile (CHIP). Children will fill out this survey 4 times over three years. The survey asks children about their satisfaction with their health, any physical or emotional discomfort they are experiencing, amount of physical activity, personal safety, risky behaviors, and physical disorders. The questions about risky behaviors include items about drug use, sex, and illegal activities. If you wish to review the survey, there is a copy at your child's school office. Children will fill out this survey during school hours. Finally, we are asking your permission to gather the following information about your child (if applicable): his or her school health service records, his or her school attendance records, and his or her Medicaid claims records.

ARE THERE RISKS?

It is possible that some of the questions in the survey may make your child uncomfortable. If your child wishes to, he or she may skip certain questions.

WHAT ARE THE BENEFITS?

Although there are no direct benefits to you and your child from participating in this study, the information you provide will add to knowledge about effective and efficient ways of providing health care services to school-aged children. The information you provide may also help in efforts to improve the quality of health care services for school-aged children in Michigan.

WHAT ABOUT PRIVACY?

The participation of you and your child in this study is confidential. You and your child's name will never be used in any public presentation or publication about this study. All information will be kept confidential, unless the researchers believe that there is danger to you, your child, or others; or if they are required by law to report information (for example, child abuse or subpoena). To protect the confidentiality of your and your child's information, it will be stored using confidential ID numbers instead of names on passwordprotected computers and in locked file cabinets in locked offices at Michigan State University. Because of these procedures, the chance that the confidentiality of your and your child's data would be violated is very small.

WHO DO I CALL WITH QUESTIONS ABOUT THE STUDY OR TO REPORT ANY PROBLEMS?

If you have any questions about the study, or wish to report a problem, please contact the principal investigator, Miles McNall, Ph.D., by phone: (517) 353-8977, fax: (517) 432-9541, email: mcnall@msu.edu, or regular mail: Kellogg Center, Garden Level, East Lansing, MI, 48824.

If you have any questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact-anonymously, if you wish-Peter Vasilenko, Ph.D., Director of Human Research Protections by phone: (517) 355-2180, fax: (517) 432-4503, e-mail irb@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824-1047.

DO I HAVE TO PARTICIPATE?

You and your child do NOT have to participate in this study. If you and your child choose to participate, either one of you may refuse to answer any question, or withdraw from the study at any time, without any penalty or loss of benefits. Your decision to let your child participate will have no impact on the health care services your child is receiving now.

INFORMED CONSENT

Your child's participation in the study

Please check the "yes" box and sign below if you agree to have <u>your child</u> participate in this study. Please check the "no" box and sign below if you <u>do not</u> agree to have <u>your child</u> participate in this study.

Yes, I AGREE to have my child participate in the study.

□ No, I DO NOT AGREE to have my child participate in the study.

Signature of Parent or Legal Guardian

Your child's name (PLEASE PRINT)

Your child's birthday (month/day/year)

Today's date

Your participation in the study

Please check the "yes" box and sign below if <u>you</u> agree to participate in this study. Please check the "no" box and sign below if <u>you do not</u> agree to participate in this study.

└ Yes, I AGREE to participate in the study.

No, I DO NOT AGREE to participate in the study.

Signature of Parent or Legal Guardian

Today's date

Your name (PLEASE PRINT)

This consent form was approved by the Social Science/Behavioral/Education Institutional Review Board (SIRE) at Michigan State University. Approved 07/08/06 - valid through 05/14/07. This version supersedes all previous versions. IRB # 06-306.

Michigan Evaluation of School-Based Health (MESH) STUDENT ASSENT FORM

WHY IS THIS RESEARCH BEING DONE & WHAT WILL HAPPEN IF I PARTICIPATE?

Your parent or guardian has given permission for you to take part in a study on the health of children in Michigan schools. If you decide to participate, you will fill out a 45-minute health survey. You will complete this survey 4 times in 3 years at your school.

This health survey asks about your satisfaction with your health, any physical or emotional discomfort you are experiencing, amount physical activity, personal safety, risky behaviors, and physical disorders. The questions about risky behaviors include items about drug use, sex, and illegal activities. Researchers will also gather information about the health care services you receive and your school attendance record during the time this study takes place.

ARE THERE RISKS?

Some of the questions in the health survey may make you feel uncomfortable. If you wish, you may skip certain questions.

WHAT ARE THE BENEFITS?

There is no direct benefit to you from taking part in this study, but your answers may help us improve health care services for other school-aged children in Michigan.

WHAT ABOUT PRIVACY?

Your participation in this study is confidential. Your own responses to this survey will not be shared with your parents, teachers, police, or any others outside of the MSU research team unless the researchers believe that there is danger to you or others, or if they are required by law to report information (for example, child abuse or subpoena). To protect the confidentiality of your information, it will be stored using confidential ID numbers instead of names on password-protected computers and in locked file cabinets in locked offices at Michigan State University. Because of these procedures, the chance that the confidentiality of your information would be violated is very small.

WHO DO I CALL WITH QUESTIONS ABOUT THE STUDY OR TO REPORT ANY PROBLEMS? If you have any questions about the study, or wish to report a problem, please contact the principal investigator, Miles McNall, Ph.D., by phone: (517) 353-8977, fax: (517) 432-9541, email: <u>mcnall@msu.edu</u>, or regular mail: Kellogg Center, Garden Level, East Lansing, MI, 48824.

If you have any questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish— Peter Vasilenko, Ph.D., Director of Human Research Protections by phone: (517) 355-2180, fax: (517) 432-4503, e-mail <u>irb@msu.edu</u>, or regular mail: 202 Olds Hall, East Lansing, MI 48824-1047.

DO I HAVE TO PARTICIPATE?

You do NOT have to participate in this study. If you choose to participate, you may refuse to answer any question, or withdraw from the study at any time, without any penalty or loss of benefits. Your decision to participate will have no impact on the health care services you are receiving now.

Your signature below indicates your voluntary agreement to participate in the study.

Signature of Participant

Date

Your name (PLEASE PRINT)

APPENDIX B:

CHIP-AETM INFORMATION

The Child Health Index Profile-Adolescent Edition was developed by researchers at Johns Hopkins Bloomberg School of Public Health. A complete copy of the measure may be ordered through www.childhealthprofile.org or by emailing chipinfo@jhsph.edu.

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