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Author

Zimmer-Gembeck, Melanie J, Helfand, Mark

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RUNNING HEAD: ADOLESCENT SEXUAL BEHAVIOR REVIEW

Ten Years of Longitudinal Research on U.S. Adolescent Sexual Behavior: Developmental  
Correlates of Sexual Intercourse, and the Importance of Age, Gender  
and Ethnic Background

Melanie J. Zimmer-Gembeck

Griffith University, School of Psychology

and

Mark Helfand

Oregon Health & Sciences University, Evidence-based Practice Center

## Abstract

We integrated findings from 35 recent, longitudinal studies of the onset of heterosexual intercourse. Correlates of adolescent sexual intercourse onset, whether in early (before age 16) or middle (ages 16 to 18) adolescence, included living with other than two biological parents, being less monitoring by parents, having more advanced physical maturity and more involvement in dating behavior, and having more permissive attitudes toward sex. When studies were organized by age of participants when sexual behavior onset was assessed, the onset of intercourse was more strongly associated with alcohol use, delinquency, school problems and (for girls) depressive symptoms in Early studies (sexual intercourse by age 15 or before only) than was found in studies classified as Middle (assessment of sexual intercourse up to age 18) or Late (knowledge of those who delayed until after age 18). Although more research is needed, additional factors were associated with delaying first sexual intercourse until after age 18, including religious attitudes and anxiety, with some factors more relevant for girls and some more applicable to boys. In total, the evidence suggests there are many similarities, but also some important differences, in the correlates associated with early versus middle versus later onset of sexual intercourse. This seems to signify more than one pathway (set of distal and proximal correlates) associated with sexual behavior during adolescence that should be tested in future research. Throughout the review, we highlight differences in the correlates of girls' versus boys' sexual intercourse and how race/ethnicity moderates associations. These gender and racial/ethnic differences were found largely in analyses of family processes, school and religion, and parent education. We end by summarizing several priority areas for future research.

Keywords: sexual behavior, adolescent development, dating, longitudinal research, relationships, family, peers

Ten Years of Longitudinal Research on U.S. Adolescent Sexual Behavior: Developmental  
Correlates of Sexual Intercourse, and the Importance of Age, Gender  
and Ethnic Background

In the last few decades researchers examining the development of adolescent sexuality have generally focused on the risks and problems associated with sexual behaviors, such as sexually transmitted infections and pregnancy. Most of these have been cross-sectional studies designed to identify the correlates of adolescent sexual behavior. Yet, in the past 10 years, two notable features have been witnessed. First, recent perspectives in adolescent psychology have considered the risks along with the potentially positive aspects of sexuality in middle or late adolescence and emerging adulthood (Blythe & Rosenthal, 2000; Russell, 2005; Smiler, Ward, Caruthers, & Merriwether; Tolman, Striepe, & Harmon, 2003), noting that during the teenage years, most adolescents in Western cultures become sexually active. The majority of young people have first sexual intercourse before graduating from high school, with over 60% and closer to 70% of U.S. adolescents engaging in sexual intercourse by age 18 (Carver, Joyner, & Udry, 2003; Grunbaum et al., 2002, 2004); most of these first sexual interactions are with the other sex (Horne & Zimmer-Gembeck, 2005; Savin-Williams & Diamond, 2004). In later adolescence sexual behavior is fairly widespread – even normative.

Second, in the last 10 years, reports from a large number of longitudinal studies have been published. In these studies, various aspects of sexual behavior have been investigated, focusing on sexual perceptions and attitudes, as well as the occurrence of sexual behaviors, such as the onset of sexual intercourse. Prospective longitudinal studies were needed to disentangle the factors that were in place prior to sexual behavior from those that emerged at the same time or after the onset of sexual intercourse. For example, in some of these longitudinal studies, researchers have found that relatively earlier onset of sexual intercourse covaries with certain

prior social environmental factors, such as features of family and peer relationships (e.g., Crockett, Bingham, Chopak, & Vicary, 1996; McBride, Paikoff, & Holmbeck, 2003; Whitbeck, Yoder, Hoyt & Conger, 1999). Moreover, longitudinal studies are essential to the identification of normative and nonnormative antecedent and concurrent correlates of first sexual intercourse at different ages.

Given that so many longitudinal studies have come of age in the last decade, the associated escalation in the number of published longitudinal studies, and the expanding focus on both risky sexual behavior and positive sexuality development during adolescence, it was the ideal time for a systematic and integrative review. This review was undertaken to provide summary of what is known about the factors that precede and covary with the onset of adolescent sexual intercourse. Because the study of age and sexual behavior is limited to correlational research, longitudinal studies or studies with intensive repeated collection of data are the best options for establishing temporal ordering. Such temporal ordering is one criterion for establishing cause-and-effect relationships (Baltes, Reese, & Nesselroade, 1986). This type of review is especially important for those considering future longitudinal research, which is costly and time consuming for both researchers and their participants. Additionally, this review provides a needed overview of what is currently known for those seeking to develop new or modify existing programs to improve the individual and social lives of young people.

In addition to providing stronger evidence of temporal ordering, such a review of longitudinal studies also could determine whether there is evidence for different groupings of correlates that may account for adolescent sexual behavior. In the current review, we refer to groupings of antecedent and concurrent (and/or distal and proximal) sexual behavior correlates as “pathways” for simplicity. Hence, *pathway* refers to a set of pre-existing and concurrent factors that is associated with sexual intercourse.

*Multiple Perspectives on Adolescent Sexual Behavior*

*Tension between sex as risky deviance and sex as positive developmental task.* The complexity of adolescent sexuality has made it difficult to develop a comprehensive theoretical framework to guide research. This means that researchers have drawn from a range of theoretical perspectives or models. For example, both Problem Behavior Theory (Jessor & Jessor, 1977; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995) and Social Control Theory (Hirschi, 1969) have been used to guide some longitudinal research on adolescent sexual behavior.

In Problem Behavior Theory (Jessor & Jessor, 1977; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995), the focus is placed on individuals' unconventional attitudes or traits and social bonds. Hence, sexual intercourse has been expected and found to be more common among young people with certain unconventional dispositional traits and among those who are relatively lacking in social bonds to conventional institutions (e.g., Capaldi, Crosby, & Stoolmiller, 1996; Goodson, Evans, & Edmundson, 1997; Jessor & Jessor, 1977; Kirby, 2002). Because of these linkages between sexual behavior, individual dispositions (e.g., unconventional attitudes) and lack of social bonds, adolescent sexual behavior has been expected to covary with other problem behavior, including such behaviors as alcohol use, aggression, and delinquency. In multiple longitudinal studies reviewed here, researchers have developed hypotheses by starting with this position and studies have been designed to examine factors associated with risky adolescent sexual behaviors (e.g., Tubman, Windle, & Windle, 1996a, 1996b; Capaldi et al., 1996; Brook, Adams, Balka, Whiteman, Zhang, & Sugarman, 2004; Raffaelli & Crockett, 2004). In these longitudinal studies, the focus often has been on early sexual debut (e.g., defined in many studies as by about age 15; Bingham & Crockett, 1996; Crockett et al., 1996; Meschke, Zweig, Barber & Eccles, 2000). Regarding the antecedents or correlates of adolescent sexual intercourse patterns, the influences of other problem behaviors and family socialization have been highlighted. This,

again, reflects the focus on unconventionality and lack of bonds to conventional institutions that pervades this literature.

Social Control Theory (Hirschi, 1969) starts with the assumption that most people will engage in deviant behavior and close bonds to conventional social institutions, especially family, school and church, are the factors that control deviant behaviors. Sexual behavior, especially among young adolescents, has been considered one of these deviant behaviors. Close connections to school and religious organizations, and attachment to organized activities have been expected to reflect conventional bonds that deflect deviance and shape adolescents' values and attitudes toward delaying sexual activity.

Other researchers have had the primary aim of improving public health, which often has the goal of understanding and improving adolescent behavior, including unprotected sexual intercourse. For example, in some studies, the aims have been to understand adolescent sexual planning and decision-making in order to guide the development of better interventions to assist adolescents to delay sexual intercourse, improve condom use or limit their number of sexual partners (e.g., Hutchinson, Jemmott III, Jemmott, Braverman, & Fong, 2003; McNeely, Shew, Beuhring, Sieving, Miller, & Blum, 2002; Sieving, McNeely, & Blum, 2000).

Finally, another perspective on adolescent sexual behavior has been described in longitudinal studies that have placed more weight on adolescent sexuality as part of normal development, while also emphasizing the importance of individual dispositions and social environments. In these investigations, researchers have emphasized the importance of biological unfolding. In what could be called a Biosocial Model (Smith, Udry, & Morris, 1985; Udry, 1988) and extensions on this model (Rodgers & Rowe, 1993), sexual activity, unlike delinquent behavior, has been described as an activity almost every person will engage in by young adulthood and includes behaviors that are likely to continue throughout much of the life course.

Because of the normative biological and relational aspects of sexual behavior, researchers with this perspective have acknowledged the importance of biological factors, such as hormones and physical maturation, and social factors related to maturation, such as dating, that may promote the onset and patterns of sexual behavior during adolescence. For example, young people who appear more physically mature seem to prompt certain responses from the social environment resulting in increased opportunities for romantic and sexual involvement (Graber, Brooks-Gunn, & Galen, 1998). Extensions of this model emphasize development and biology within a context of social contagion – the spreading of ideas and activities within a social environment at times of transition – to explain adolescent sexual behavior (Rodgers & Rowe, 1993).

*The possibility of multiple pathways.* None of these theories and perspectives includes an explicit description of different pathways associated with adolescent sexual behavior. However, these theories do not preclude the possibility of multiple pathways. In addition, when these various theories are simultaneously considered along with other related areas of research and theory on the development of adolescent behavior (e.g., Moffitt's theory of antisocial behavior, 1993), there could be at least two correlational pathways associated with sexually intercourse onset before the age of 18. One pathway would include certain dispositional traits marked by unconventionality, problem behaviors, and lack of social bonds to family, school or other social institutions. A second pathway might include certain biological characteristics (e.g., earlier maturation, particular hormonal levels or patterns), some problem behavior at a lower and more common level than the other group (e.g., experimentation with alcohol, other minor delinquent acts) and, because popularity with peers has been associated with earlier dating (Feldman, Rosenthal, Brown, & Canning, 1995; Franzoi, Davis, & Vasquez-Suson, 1994), peer group success. The first pathway would be more likely found when onset of sexual intercourse is most deviant from the norm and the most risky, such as very early onset of sexual intercourse. The



second pathway would be more representative of a typical adolescent and found when onset of sexual intercourse occurs at an age when it is more typical (i.e., when a larger proportion of adolescents initiate sexual intercourse). This suggests that two pathways could be identified when studies of early onset of sexual intercourse (often defined as before age 14 or 15) are separated from those that also examine correlates of onset closer to what is average or typical in the U.S. (ages 16 to 18). One purpose of the current review was to organize studies in this way in order to illuminate whether multiple pathways may be present. Encouraging findings could direct future research toward confirming multiple pathways.

The possibility of two pathways associated with adolescent sexual behavior is quite consistent with Moffitt's (1993) theory that knowing age of onset of antisocial behavior among adolescents would identify two different pathways to membership into what had historically been studied as one group of antisocial adolescents. This one group was expected to share certain developmental histories and have a common set of factors associated with the onset, continuation, and escalation of their problem behaviors. Moffitt proposed that antisocial adolescents could be differentiated into two groups with differing developmental histories and different age of onset (early versus later) of antisocial behavior. Because of the strong evidence of covariation between sexual behavior and antisocial behavior (usually defined to include alcohol and other drug use, delinquent acts, and aggression), Moffitt's theory provided a foundation for expectation of two pathways to adolescent sexual behavior and how these groups might be identified after grouping adolescents by age of sexual intercourse onset.

There are other theories that do not preclude the possibility of two correlational pathways associated with adolescent sexual behavior. These theories include the biopsychosocial health model that integrates biology, psychological factors and environmental experiences (Weiss, 2000), the life-span developmental perspective (Baltes, Reese, & Lipsitt, 1980), and the stage

termination model of development (Peskin, 1973; see also Bingham & Crockett, 1996). Each of these models identifies behavior as impacted by the dispositions and biological development of the individual, as well as being shaped by the environment via learning, modeling, and opportunities. Influential environments include those at the more proximal level of the family, close dyadic relations, and the friendship group, and also include the broader contexts, for example, of the peer group, school, neighborhood, cultural and religious structures, and government policies. Adolescent may report similar behavior, but they may have experienced different combinations of individual and environmental experiences that partially account for or covary with their behaviors. Adding to this, each model points to the likelihood that the most problem pathway will be found among those individuals who have experienced significant transitions earlier than most of their peers. It will be this group -- those who have first sexual intercourse relatively earlier than most of their peers -- that would be expected to have a greater history of difficulties prior to adolescence and who would continue to have more problems during adolescence.

#### *Overview of the Current Review*

In the current review, studies were organized by age of assessments of sexual behavior. This had not been done in any previous review, but is critical for an understanding of developmental issues, such as differential correlates in different age periods. The aim of using this organization was to attend to studies that predicted the earliest onset of sexual intercourse and not later onset (*Early*, sexual intercourse by age 15 only), first sex by *up to* middle adolescence (*Middle*, assessment of sexual intercourse that includes after age 15 but not later than age 18) or delaying onset of sexual intercourse (*Late*, identification of those who delayed until after age 18). Some researchers stated that attention to age was critical in their studies. For example, in some studies, an aim was to test the possibility of multiple pathways to sexual

behavior (Tubman et al., 1996a, 1996b; Whitbeck et al., 1999) or to study identified groups with different patterns of sexual behavior who were differentiated by preexisting factors or concurrent correlates (Bingham & Crockett, 1996, Crockett et al., 1996). In each of these studies, a range of measures was included that encompassed family relationships and deviant behavior. Often other potential correlates were assessed, such as biological development and quality of peer relationships, acceptance by peers or dating (Bingham & Crockett, 1996; Crockett et al., 1996; Whitbeck et al., 1999), or adolescents were grouped by their patterns of sexual behavior over a period of time and groups were compared (Tubman et al., 1996a, 1996b). These studies more explicitly tested the possibility of different pathways to sexual intercourse during adolescence that depended on age of onset *and* correlates of sexual abstinence until after age 18.

In sum, recent longitudinal studies that assessed the age of first sexual intercourse or patterns of sexual intercourse over time were identified. Our key aim was to review studies that examined a range of factors potentially associated with adolescent early or later onset of sexual intercourse and sexual abstinence until age 18 among general community samples of U.S. adolescents. A secondary aim was to determine whether findings pointed to at least two pathways (i.e., sets of different correlates) to sexual intercourse behavior that could be linked to early versus mid-adolescence onset of sexual intercourse. We also included a review of correlates associated with sexual abstinence until the late teenage years. Longitudinal studies were included that focused on factors associated with the age, grade or timing (e.g., early, average, late) of first sexual intercourse or patterns of sexual behavior over time. In these studies, it was required that the first wave of assessment was completed when participants were younger than age 18. The definition of early sexual intercourse varied somewhat from study to study, but our organization of studies by age overcame this study variability to some extent. Yet, this review was necessarily constrained by the methodologies of included studies.

Adolescents' biological sex<sup>1</sup> and race/ethnicity were important factors to consider. Many researchers have recognized the importance of both of these demographic characteristics by studying only boys (e.g., Capaldi et al., 1996), girls (e.g., Halpern, Udry, Campbell, & Suchindran, 1999), examining boys and girls separately (e.g., Meschke et al., 2000), limiting the study to racial/ethnic minority adolescents (e.g., Smith, 1997), or examining racial/ethnic groups separately (e.g., Costa, Jessor, Donovan, & Fortenberry, 1995). Although analyses within the included studies often were conducted separately for boys and girls, rarely were gender and race/ethnicity examined as moderators of associations between sexual intercourse experience and proposed antecedents or correlates using interaction effects. This added some complexity to our review in order to highlight how correlates of adolescent sexual intercourse behavior might be identified for one or two demographic subgroups or for an ethnically and racially diverse group of boys and girls, but may require additional research in order to conclude that findings apply to all demographic subgroups or significantly differ between groups. Finally, it would have been preferable to provide more information about adolescents who had sexual interests or engaged in sexual behavior with the same-sex, but most studies in this systematic review did not mention gay, lesbian, or bisexual adolescents and/or sexual behaviors with the same-sex.

### Method

We searched electronic databases to identify longitudinal studies of adolescent sexual behavior published between 1995 and 2004. Included studies examined associations between (a) adolescent age of first sexual intercourse or patterns of sexual intercourse over time and (b) individual or social factors. After meetings with content experts and a preliminary examination of a convenience sample of literature, a set of terms was selected to begin the literature search. Librarians, with involvement of content experts, developed the search strategies. Search terms included *sexual behavior*, *sexual intercourse*, *sexuality*, *contraception*, *contraceptive use*, *sexual*

*partners, reproductive health, sexual risk, condom use, coitus, and health risk behaviors.*

Searches were limited by the terms (*adolescent, adolescents or adolescence*) and (*prospective or longitudinal*). To supplement these searches, we searched by the names of authors of longitudinal studies that had been located, and examined the reference lists of reviews and retrieved empirical articles. Studies were included if they were longitudinal in design (i.e., had at least one assessment of proposed sexual behavior correlates prior to an assessment of sexual behavior), examined adolescent sexual behavior that included sexual intercourse, examined more than one potential correlate of sexual behavior, included an assessment of correlates before age 18, included an assessment of sexual intercourse activity before age 18 for most participants, was published between January 1995 and December 2004, included a general community sample of U.S. adolescents, and was published in a peer-reviewed journal.

Information extracted from each study included the stated purpose, study design, sample characteristics, retention, procedures for handling missing data, constructs assessed and measures, analytic methods, results as described, and univariate and multivariate effect sizes or other statistical results. Findings were qualitatively summarized, with some quantitative summarization, paying particular attention to gender, race/ethnicity, age differences, number of covariates, and other characteristics of study sample or design that could account for variability in study findings. In the following sections, we first provide an overview of the literature search and brief descriptions of study designs and measurement methods, and describe our methods used to classify studies for presentation in a table describing each study (Table 1) and tables that provide more detailed findings from each study (Tables 2 to 11). This is followed by a summary of findings for each category of correlate, starting with potential individual correlates (e.g., puberty, alcohol use, and school performance) and ending with proposed environmental influences of family and peer relationships. Broad categories of correlates were biological,

behavioral, school-related, religion-related, attitudes, mental health, self-esteem, family status, family process, and peer-related. We follow this section on each covariate with an integration of findings across covariates, and considerations of gender and race/ethnicity.

## Results

### *Overview of the Literature Search and Included Studies*

More than 1000 studies were identified in database searches (Medline, PsycInfo) and reference lists of reviews and retrieved studies. The vast majority of these studies examined sexual abuse, sexual offending, pregnancy and other factors outside the domain of this review. In addition, most were cross-sectional in design. After examination of abstracts, there were 35 longitudinal studies of U.S. adolescent sexual intercourse onset. Studies reported on 26 independent samples with at most 4 studies published from a single sample. For each study, Table 1 describes the sample, attrition, sexual behavior definitions, number of study waves, ages of participants, correlates/predictors examined, and type of statistical analyses conducted. Studies from the same sample were summarized as a set and appear in the list according to the first author of the earliest publication.

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 Insert Table 1 here  
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Studies had between 2 and 13 waves of data collection with the shortest follow-up periods from a large study with two waves and an 8-month lag (Kinsman, Romer, Furstenberg, & Schwarz, 1998), and 4 studies from one U.S. representative sample of adolescents with 2 assessments and a 1-year lag (*AddHealth*; Longmore, Manning, Giordano, & Rudolph, 2004; McNeely et al., 2002; Meier, 2003; Sieving et al., 2000; see Table 1). The longest studies followed participants for 11 years with 3 assessments (Miller, Norton, Fan, & Christopherson, 1998; Schvaneveldt, Miller, Berry, & Lee, 2001) and 13 years with annual assessments (Ellis et

al., 2003). Sample sizes ranged from 34 (Romo, Lefkowitz, Sigman, & Au, 2002) to 7965 (Longmore et al., 2004), resulting in a total of over 30,000 participants. Fourteen studies had sample sizes above 500 even after a high attrition rate across studies (median attrition rate = 37%), and 5 studies had sample sizes under 200 (French & Dishion, 2003; Halpern, Udry, & Suchindran, 1998; McBride et al., 2003; Romo et al., 2002; Waller & Dubois, 2004)

Nine studies were from three independent U.S. national samples (Longmore, Manning, & Giordano, 2001; Longmore et al., 2004; McNeely et al., 2002; Meier, 2003; Miller et al., 1997; Mott, Fondell, Hu, Kowaleski-Jones, & Menaghan, 1996; Raffaelli & Crockett, 2003; Schvaneveldt et al., 2001; Sieving et al., 2000). Other studies represented a range of areas of the U.S., with half ( $n = 13$ ) of the 26 studies with non-national samples including a high proportion of ethnic minority adolescents and the other 13 including mostly white adolescents. Study samples represented a range of socioeconomic status levels, although this was not always reported.

In all studies, sexual activity was assessed via self-report survey or interview, and in all cases young people were asked to retrospectively report their sexual involvement over periods ranging from a week to 5 or more years previous. The first wave of data collection usually included an assessment of predictor variables as well as the first data on sexual behavior. Hence, most results combine retrospective, concurrent and prospective data, with age of sexual intercourse debut sometimes occurring before the first assessment of predictors/correlates. However, in many studies, participants who had sexual intercourse prior to the first wave of data collection were excluded from analyses (see Table 1).

### *Presentation of Results*

To organize the findings of each study, a list of categories was developed to classify all measured covariates of adolescent sexual intercourse. Tables 2 to 11 provide results for each of

the categories. To highlight the organization of studies by age, each row in each Table indicates whether the study was focused only on sexual intercourse onset before or at age 15 only (*Early*) or, alternatively, included sexual behavior onset up to age 16-18 but not after (*Middle*), or had information about delay of first sexual intercourse until after age 18 (*Late*). The individual study findings are organized by this category and first author. Many analyses were conducted by gender, and in other studies, analyses were conducted by racial/ethnic group or with particular age groups. Hence, demographics are noted in Tables 2 to 11 when analyses were limited to particular groups.

Most studies used some form of multivariate modeling (with 2 to 28 covariates) to predict onset or patterns of sexual intercourse over time; survival analysis was used in 12 studies, logistic regression was used in 11 studies, and 8 studies used some form of linear modeling (see Table 1). Hence, outputs from these multivariate analyses were (a) partial odds ratios or relative risks with values greater than 1 indicating increased risk of first sex and values between 0 and 1 indicating reduced risk or (b) standardized parameter estimates in which positive effects indicate a positive association between the outcome and predictor, whereas negative effects indicate a negative association. Other studies conducted group comparisons with analysis of variance or *t*-tests only. Although there are limitations when converting odds ratios and *t* or *F* values to a common effect size, such as *r*, the last column of Tables 2 to 11 contains this common effect size to allow easier comparison across studies and variables (Chinn, 2000). In this review, we use these common effect sizes and the consistency of the significance of effects across studies within categories to draw conclusions about findings for Early, Middle or Late onset of sexual intercourse, for boys versus girls, and for different racial/ethnic groups. Before calculating the median effect sizes that are reported in the text below, we took the absolute value of each effect size. However, we did not conduct statistical comparisons of differences between effect sizes,



given the range of different analytical methods, sample characteristics and measures used.

Although we draw some conclusions by comparing effect sizes, and these conclusions were often convincing and informative, we caution that we did this by looking for substantial differences in effect sizes and differences in consistency across studies that differed by age or diversity of the sample, and future research should be designed to directly test our conclusions.

#### *Review of Findings: Age-Related Prevalence*

Depending on region, race/ethnicity and adolescents' biological sex, 13-35% of U.S. young people initiate intercourse by the end of grade 8 (Capaldi et al., 1996; Halpern et al., 1998; Kinsman et al., 1998; Mott et al., 1996; O'Donnell, Myint-U, O'Donnell, & Stueve, 2003; Santelli, Kaiser, Hirsch, Radosh, Simkin, & Middlestadt, 2004; Waller & Dubois, 2004; Whitbeck et al., 1999). By about age 16-17, 50-70% of adolescents have experienced sexual intercourse (Capaldi et al., 1996; O'Donnell et al., 2003; Smith, 1997), and 70-90% have had first sexual intercourse by age 18 (Bingham & Crockett, 1996; Capaldi et al., 1996; Smith, 1997). Overall, a first experience of intercourse was most common between ages 15 to 17 (Bingham & Crockett, 1996; Brown et al., 2004; Longmore et al., 2001; Upchurch, Aneshensel, Sucoff, & Levy-Storms, 1998).

#### *Review of Findings: Antecedents and Correlates of Adolescent Sexual Intercourse*

##### *Gender and Race/Ethnicity*

In studies that specifically examined gender and age of first sexual intercourse, the average male initiated sexual intercourse earlier than the average female in 7 of 11 studies. 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. Overall, 11 of 15 studies found associations between age of first sexual intercourse and race/ethnicity, with larger

studies more likely to support racial/ethnic differences in age of first intercourse. A Black adolescent male was, on average, 2.8 more likely to have a history of sexual intercourse when compared to white adolescents. When boys and girls were examined separately, Black girls were not found to initiate sexual intercourse significantly earlier than girls from other racial/ethnic backgrounds. For example, in a study that recruited participants by using probability sampling from 49 census tracts in Los Angeles (Upchurch et al., 1998, 1999), the median reported age of first sexual intercourse was 15.0 years for Black males, 16.3 years for Black females, 16.6 years for white males and females, 16.5 years for Hispanic males, 17.3 years for Hispanic females, and 18.1 years for Asian American males. Information on Asian Americans, particularly girls, and Native American adolescents is limited in current studies.

Most studies adjusted for some measure of socioeconomic status (5 studies) or parental education (2 studies), as well as accounting for a number of covariates, but an association between earlier onset of intercourse and race/ethnicity (Black male) remained. Only in one study that included 27 other covariates, which included behaviors that are likely to be more proximally associated with sexual behavior than race/ethnicity (e.g., dating behavior), there was no association between earlier age of first sexual intercourse and being Black male rather than a member of other ethnic/gender groups (Miller et al., 1998). Although a review of all of the evidence showed that Black and white girls may not differ in their average age of first intercourse or rates of early onset, regional differences may exist. For example, in the only study from the southeast of the US, Halpern et al. (Halpern, Udry, & Suchindran, 1997) reported that Black females had their first experiences of sexual intercourse earlier than white females. In this study, 35% of Black females, while only 6% of white females had initiated sexual intercourse by grade 7 or 8 (about age 13-14). Rates of first sexual intercourse increased to 49% of Black females and 27% of white females by grade 9 to 10 (about age 15-16).

*Pubertal and Physical Maturation*

Young people who physically mature relatively earlier than their peers are slightly more likely to have first intercourse earlier, but this association was inconsistent across studies and was usually small (see Table 2). In 12 studies with analyses of 6 samples of girls, 5 samples of boys and 4 mixed gender samples, physical maturation or a related measure was investigated. In 4 samples of girls and 2 samples of boys, small and significant effects were reported,  $r$ s of .3 or less (Cohen, 1988). The median effect size across all studies was .12 ( $N = 3833$ ). In two studies, one with analyses by gender (Meschke et al., 2000) and one small study with a mixed gender group (French & Dishion, 2003), an association between age of first intercourse and pubertal status was reported in univariate, but not multivariate analyses. All but 2 studies adjusted for age in multivariate analyses or compared age groups. Taken as a whole, studies of pubertal development must conduct analyses by gender or examine gender as a moderator of associations between adolescent sexual behavior and biological development or physical characteristics, and most current studies have conducted such analyses. Effects of pubertal maturation were rarely found when studies did not conduct analyses separately for girls and boys.

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 Insert Table 2 here  
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Although most studies included a majority of white adolescents, findings did not appear to be isolated to any racial/ethnic group. Some previous reviews have noted that the association between physical development and sexual behavior is particularly clear in samples of adolescent females (Goodson et al., 1997; Kirby, 2002; Kotchick, Shaffer, Forehand, & Miller, 2001), but pubertal development was associated with boys' sexual behavior in one small study of testosterone (Halpern et al., 1998) and, in one moderate-sized study classified as Early, it was associated with boys' physical maturation (Miller et al., 1998).

In addition to the necessity of conducting analyses by gender, there are three other study design issues to highlight here. First, the particular measure of physical maturation seems to matter. Among girls, it was a simple dichotomous measure of whether or not one was menstruating (rather than age of first menarche) and testosterone level that was associated with relatively earlier onset or having the experience of first sex. Second, studies that found associations tended to gather reports of this information closer to the time of onset (rather than asking for recall over a number of previous years) or used shorter lags between assessments and repeatedly measured details about hormone levels and changes in maturation over time. Third, although a number of different measures of pubertal and physical maturation were used making comparisons across studies difficult and there were less than 5 studies in each category, there was an emerging pattern of more significant findings in studies classified as Early or Late compared to Middle, especially in samples of boys. This may suggest that pubertal development best differentiates adolescents with early onset (before age 16) or delayed onset (after age 18) from others. In fact, the difference is most clear when the group with early onset is compared to those with late onset of sexual intercourse (at or after age 18).

#### *Behaviors and Attitudes*

*Problem behaviors.* There was no particular type of problem behavior (e.g., alcohol use, other drug use, delinquency, fighting) that was significantly associated with sexual intercourse behavior in every study reviewed (see Table 3). A diverse range of adolescent problem behaviors were investigated in 16 studies (from 13 samples,  $N = 8953$ ), and, in all but 1 study, there was an association between age of first sexual intercourse and problem behavior, either in univariate or multivariate analyses. No significant associations between age of first intercourse and problems behaviors were found in 3 studies of 3 independent samples, and all studies used multivariate analyses to adjust for a wide range of family (e.g., emotional support, monitoring, coercion) and

peer factors (e.g., deviant peers, peer pressure, dating), as well as pubertal maturation (French & Dishion, 2003; National Longitudinal Survey of Youth - Mott et al., 1996; Whitbeck et al., 1999). In addition, no significant association between onset of sexual intercourse and risk proneness was found in one study using data from the National Longitudinal Survey of Youth (Raffaelli & Crockett, 2003). Overall, age of first intercourse was associated with a median 33% of problem behavior measures in multivariate analyses, and the median effect size was .25.

Although an association between age of first intercourse and problem drinking among Hispanic, but not among Black and white, adolescents was reported by Costa et al. (1995), there was little convincing evidence that findings were isolated to particular racial/ethnic groups. Rather, gender was the more important consideration. Certain behaviors were more consistently associated with sexual behavior than others, and these differed by gender. Relatively greater alcohol use, especially among boys, and boys' aggression / antisocial behavior were the two behaviors that had the most consistent associations with earlier onset of sexual intercourse. In contrast to findings for boys or mixed gender samples, girls' earlier onset of sexual intercourse was associated with substance use in multivariate analyses, but was not associated with other behaviors, such as fighting. In sum, effects sizes were larger and more likely significant when only boys were included in analyses and in Late studies of boy's antisocial behavior, and effects for substance use appeared stronger in studies than in Middle or Late studies.

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In univariate analyses (Bingham & Crockett, 1996; Ellis et al., 2003; Tubman et al., 1996a, 1996b), earlier first sexual behavior (and patterns of sexual intercourse activity) was associated with a range of problem behaviors, such as substance use, drug use, deviance and fighting, but multivariate analyses to adjust for confounds showed that many of these measures do not account

for additional variance in sexual intercourse behavior once alcohol use and delinquency are considered. In fact, in multiple studies, delinquency was not associated with sexual behavior once alcohol use was considered. Adding further evidence that problem behaviors are intercorrelated, there was no significant association between the percentage of significant findings for problem behaviors within a study and the number of different behavioral measures,  $r = .17$ . Hence, predictive power does not seem to be increased substantially when more measures are included. Future research on adolescent sexual behavior should carefully select a good measure or two rather than using a high number of different measures of adolescent behaviors. In fact, the evidence here shows that the best two choices will be careful measures of alcohol use and delinquency / antisocial behavior, and that delinquency may be associated with boys' sexual behavior but not girls' behavior. Nevertheless, types of delinquency and aggression (physical, fighting) studied are more common in boys than in girls (see Geiger, Zimmer-Gembeck, & Crick, 2004 for a discussion of gender and aggression), and further study of aggressive behaviors, such as relational or social aggression, could be included in future studies.

*School-related behavior and attitudes.* Findings for school-related behavior and attitudes were similar to those described for problem behaviors; several studies indicated that early onset of sexual intercourse is associated with more problems, but these findings were not always as clear or consistent (see Table 4). Eleven studies (of 8 independent samples,  $N = 6660$ ) included measures of school-related *behavior* (including measures of school performance). Significant associations with sexual intercourse behavior were found in 8 studies of 7 independent samples, 4 samples with significant findings in multivariate analyses and 3 samples (4 studies) with significant findings limited to univariate analyses only. Three studies classified as Late included measures of school-related behavior or attitudes, and only one, with five measures of academic performance, found associations with adolescents' sexual intercourse behavior that were limited

to white boys (Schvaneveldt, Miller, Berry, & Lee, 2001). Hence, most significant findings were isolated to studies classified as Early or were in studies classified as Middle that conducted univariate comparisons of adolescents with early first sexual intercourse (or certain patterns of sexual intercourse behavior) to other groups. As Tubman et al. (1996a) also concluded, we conclude that the onset of sexual behavior and academic grades during middle adolescence or later do not seem to be associated. Instead, it is early age of first sexual intercourse that may be linked to lower grades and other school-related behavior problems, and it is sexual intercourse that is consistent and is both within and outside of steady relationships that is associated with poorer grades and other school-related problem behaviors during the ages of 16 to 18. Additionally, findings seem to depend somewhat on race/ethnicity of the sample, with two studies reporting an association between age of first sexual intercourse and school performance among white adolescents, but not among Black or Hispanic adolescents (Costa et al., 1995).

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Measures of school-related *attitudes* were included in 7 studies (of 6 independent samples,  $N = 4289$ ), with 6 studies focused on school aspirations or educational plans (see Table 4). In 5 of the 6 studies, adolescents with early onset of sexual intercourse (defined as before age 16) had lower school aspirations and educational plans. Associations were not isolated to particular racial/ethnic groups, but may be stronger among females; in the 2 studies with analyses by gender (one classified as Middle and one as Late), associations were found for girls and not boys (Black and Hispanic girls only, Smith, 1997; white girls only, Schvaneveldt et al., 2001). Although conclusions should be considered tentative given the small number of longitudinal studies, age of first sexual intercourse, and school attitudes and educational aspirations may not be associated among Black or white boys.

*Religious behavior and attitudes.* There were 5 moderate-sized studies from 4 samples ( $N = 1974$ ) that included measures of religious behavior. There were 3 larger studies that included measures of religious attitudes ( $N = 6292$ ). The numbers of individuals included in studies of behavior and the small number of studies of religious attitudes made drawing conclusions about age, gender and race/ethnicity difficult. Nevertheless, the findings, especially univariate comparisons of those with early, middle and later onset of sexual intercourse, did add to the identification of correlates linked to delaying first sexual intercourse until age 18 or later (see Table 5). Findings were weak and inconsistent, however, and account for the discrepant conclusions of previous reviews, with Goodson et al. (1997) and Rostosky et al. (Rostosky, Wilcox, Comer Wright, & Randall, 2004) concluding that religious involvement and attitudes do have a delaying effect on sexual behavior, Kotchick et al. (2001) concluding somewhat the opposite, and Kirby (2002) noting that associations are weak and inconclusive.

In 3 studies with multivariate analyses, age of first sexual intercourse was not associated with religious *attendance*, unless univariate analyses were conducted to compare those with late onset (age 18 or after) to other adolescents (Crockett et al., 1996) or girls and boys attended church with friends and the sample included a substantial proportion of nonwhite adolescents (Mott et al., 1996). Another 2 studies showed that later age of first sexual intercourse is associated with religious *attitudes* (in one case, liking religious services, Miller, Norton, Curtis, Hill, Schvaneveldt, & Young, 1997; in the other case religiosity combined with church attendance included in the AddHealth dataset, Meier, 2003). In both cases, these effects were small, found among girls only, and were based upon samples with substantial proportions of nonwhite adolescents.

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Given this mixed evidence and the largest effect size for attending church with friends, additional research on the interface between religion and friendship is needed, especially including girls and nonwhite adolescents. These studies should include a focus on the religious and sexual socialization of friends and the selection of friends. In essence, more research on the mechanisms accounting for the influences of peers on sexual behaviors is needed, and one potential mechanism is shared religious values and associated behaviors.

*Attitudes toward sexual behavior.* Sexual intercourse behavior was associated with attitudes toward sexual behavior, such as whether it is okay to have sex during adolescence or whether it is better to abstain until later or marriage (see Table 6). In 7 of 8 studies (total  $N = 10604$ ), 4 classified as Early, 1 very small study classified as Middle, and 2 studies classified as Late, adolescents' earlier onset of sexual behavior was associated with relatively greater liberal and permissive attitudes towards sexual behavior, and delaying onset was associated with having relatively stronger abstinence attitudes, perceiving greater costs and fewer benefits of sex, and greater perceptions of being able to refuse and refrain from intercourse. Considering all findings, evidence suggests that these findings apply to both boys and girls, and to nonwhite and white adolescents.

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### *Mental Health*

The included studies relied on a range of different measures of mental health as correlates of sexual intercourse, including depressive symptoms, anxiety, shyness, loneliness and clinical disorder. In addition, early behaviors that may be indicative of mental health or physical problems, such as bed wetting were investigated. This variety makes drawing conclusions about associations between sexual behavior and mental health difficult. Yet, two findings can be

highlighted. First, there is some evidence of relatively more depressive symptoms among girls who have early onset of sexual intercourse and second, anxiety may be associated with boys delay of first sexual intercourse into later adolescence (age 18 or after; see Table 7). However, even these findings were weak, not consistent across studies or only addressed in one study. Only 3 of 6 studies (total  $N = 11238$ ) reported more depressive symptoms among girls who had first sexual intercourse early (Longmore et al., 2004; Meschke et al., 2000; Smith, 1997), and 1 study using AddHealth data reported an association for boys (Longmore et al., 2004). Regarding the finding of a delay in onset of intercourse among boys with higher anxiety, there is only one moderate-sized study that has examined anxiety and this study only included boys (Capaldi et al., 1996,  $N = 206$ ). No delaying effect of loneliness was found when participants were only followed into mid-adolescence (age 17; Mott et al., 1996,  $N = 450$ ) and Tubman et al. (1996b,  $N = 921$ ) reported no association between patterns of sexual behavior across the ages of 16 and 18, and avoidance disorder among boys or girls.

Studies were not numerous or heterogeneous enough to draw conclusions regarding racial/ethnic differences. However, using the national AddHealth sample and separate analyses for boys and girls, Longmore et al. (2004,  $N = 7965$ ) used interaction effects to test whether the association between age of first intercourse and depressive symptoms differed by age. Among boys and after excluding those who had first sex prior to the study, the positive association between sexual intercourse behavior and depressive symptoms was not moderated by age. For girls, age did moderate this positive association, with the risk of having first sex linked with more depressive symptoms only in the very youngest girls who had first sex during the one year of the study.

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### *Self-Esteem, Confidence, and Autonomy*

In 4 studies from 3 samples classified as Early or Middle ( $N = 1442$ ), age of first sexual intercourse was not associated with self-esteem, self-regulation or self-confidence (see Table 8). However, there was an association between age of first intercourse and self-esteem when age was considered as a moderator (AddHealth data; Longmore et al., 2004,  $N = 7965$ ) and when multiple domains of self-perceptions were assessed (Waller & Dubois, 2004,  $N = 134$ ). In a multivariate analysis with AddHealth data, Longmore et al. (2004) found no significant association between onset of intercourse during the study period and self-esteem among girls. However, a significant age X self-esteem interaction revealed a positive association between earlier age of first intercourse and self-esteem among boys age 17 or older after accounting for depressive symptoms, race/ethnicity, family income, dating, mother's education and family composition. This association between sexual debut and self-esteem was not significant among younger boys (age 13 or 15). This positive association might be better understood by considering another small study (Waller & Dubois, 2004). In this study, negative school-related self-evaluation was associated with decreased risk of early first intercourse, whereas positive athletic self-evaluation was associated with an increased risk. Domain-specific self-evaluations might provide more precise information about links between sexual behavior and self-related thoughts and feelings than a measure of global self-esteem.

Overall, there have been few longitudinal studies that include measures of self-esteem and self-perceptions of competence. Yet, findings suggest that, when general measures of self-esteem are used, sexual intercourse onset is not associated with self-esteem, but there may be associations with domain-specific measures of self-esteem and self-perceptions of competence.

Domain-specific measures of self-esteem and perceptions of competence, such as those describe by Harter (1999), may be more useful in future research.

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Adolescents' autonomy also was examined in 1 study from the National Longitudinal Study of Youth. Raffaelli and Crockett (2003, N = 443) found that age of first sexual intercourse was earlier among adolescents with relatively higher self-reported levels of autonomous decision-making. Hence, adolescents' perceived autonomy deserves further examination as a potential proximal correlate of sexual intercourse behavior among adolescents.

#### *Family Factors*

*Family status.* Family factors were commonly considered in the included studies (see Table 9). Yet, there were only small and inconsistent associations between adolescent sexual intercourse behavior and most measures of family status (e.g., family structure, educational level of parents, socioeconomic status). In each study, 1 to 9 different family status measures were included. Overall, a significant association between age of first sex and family status was reported a median of 25% of the time. When significant effects were found, they were usually small to moderate in size (see below). There was no significant association between the percent of significant findings and the number of statistical tests completed,  $r = -.02$ , or between the percentage of significant findings and the number of constructs measured,  $r = -.12$ . Considering these correlations along with univariate associations and multivariate analyses and, we concluded that it is one or more *particular* aspect of family status that is most important. More specifically, it was family structure that was most consistently linked to age of first sexual intercourse.

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In 10 of 17 studies (13 independent samples, total  $N = 15615$ ), later age of first intercourse was more likely when adolescents lived in an intact family unit (e.g., 2-parents, married parents) or the odds of early onset were increased when living with single parents or in blended families. In analyses that included between 5 and 16 covariates, the median effect size was .18. Associations were not stronger among girls or boys, or among nonwhite as compared to white adolescents. Associations were found among Hispanic (Costa et al., 1995) and white mixed gender groups of adolescents (Longmore et al., 2001), Black and Hispanic boys and girls (Smith, 1997; Upchurch et al. 1998, 1999), Black and white girls (Miller et al., 1997), and mostly white girls (Meschke et al., 2000). However, findings were more consistent among studies classified as Late and least consistent among studies classified as Early, suggesting that family structure best differentiates those with Early onset from those with Late onset of first sexual intercourse. The 6 studies with no significant associations between sexual intercourse behavior and family structure provide some indication that including more measures of family processes (see next section) or adolescents' perceptions of their autonomous decision-making or peer factors may account for these associations. For example, no associations were found in a study using AddHealth data that controlled for eight family process measures (e.g., communication with parents; McNeely et al., 2002), and no association was found in a study that adjusted for adolescents' perceptions of their autonomous decision-making (Raffaelli & Crockett, 2004).

Education level of parents (usually mothers) had a small delaying effect on the age of first intercourse in 8 of 14 studies (10 independent samples; total  $N = 14328$ ). In 6 of the 8 studies, the association was limited to girls, and most often the studies included mostly white adolescents or findings were limited to white adolescents. Conversely, most participants were nonwhite in 5 of the 6 studies that reported no association between age of first intercourse and parent educational level. Effects were usually small, with a median effect size of .12. In summary, it

appears that having parents with a college education is associated with white girls' delay of first sexual intercourse, but there is less evidence for this association among boys and nonwhite adolescents.

Socioeconomic status did not fare as well as family structure and parent education. Of 12 studies (11 independent samples, total  $N = 13116$ ), the risk of early onset of sexual intercourse (by age 15) was slightly higher with lower socioeconomic status in only one analysis that was limited to a white, mixed gender group of adolescents (Costa et al., 1995), and the median effect size over all studies was .06. Finally, a variety of other family status variables were examined in 10 studies (8 independent samples). For example, in two studies using data from the National Longitudinal Study of Youth, associations were reported between adolescent sexual intercourse behavior and having a young mother at birth and a mother who had earlier onset of menarche (increasing the odds of onset by age 15 among girls in Raffaelli & Crockett, 2004,  $N = 443$ ; increasing the odds of onset up to age 17 for girls and boys in Mott et al., 1996,  $N = 450$ ; see Table 9). Few other associations with sexual behavior were reported.

*Family process.* Multiple theories suggest that having connections to conventional institutions, such as the family, should be associated with delayed onset of sexual intercourse (see Benda & DiBlasio, 1991; Hirschi, 1969; Jessor & Jessor, 1977). This was not clearly revealed here, even after family process measures were placed into one of four categories, including (1) parent support (e.g., warmth, involvement), (2) parental monitoring behaviors (e.g., supervision, curfew), (3) control or coercion (e.g., control, permissiveness), and sex-specific or other parent-adolescent communication. Although age of first intercourse was associated with at least one measure from each category in at least one study, the evidence of an independent association was mixed for parental support and monitoring, and weak for parental control.

However, onset of intercourse is associated with parents' provision of direct information about lack of approval of sexual behavior and values of abstinence.

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Regarding parent support, in 6 of 13 studies (from 11 samples, total  $N = 7711$ ), it was found that warm, positive or supportive parent-child relationships had small delaying effects on sexual intercourse onset; this was found in mixed gender groups and when boys and girls were analyzed separately. In addition, although more research is needed to test race/ethnicity as a moderator of associations between age of first sexual intercourse and family support and connection, there was little evidence that associations were stronger among nonwhite as compared to white adolescents. Regardless of gender and race/ethnicity, effect sizes were almost always small, median effect size = .04. Constructs associated with sexual intercourse behavior included attachment, closeness, connectedness, positive family relationships, mothers' satisfaction with the mother-adolescent relationship, and conflict (as reported by adolescents, but not when reported by the parents). Constructs not associated with sexual intercourse behavior were family activities, observed family conflict and positive affect, parent and home support, and mother rejection or withdrawal of love.

After adjusting for between 8 and 13 other covariates, 6 of the 8 studies (total  $N = 4874$ ) found small, significant associations between the timing of first sexual intercourse and parental monitoring in univariate or multivariate analyses, median effect size = .07. Higher level of monitoring was associated with delay in age of first intercourse. All multivariate associations were found in samples that included a significant proportion of nonwhite adolescents. Constructs significantly associated with age of first sex included parental monitoring among one mixed gender small (French & Dishion, 2003) and large (Longmore et al., 2001) samples, and one

moderate sized sample of mostly white girls (Ellis et al., 2003), but this association was not found in another large, mostly white, mixed gender sample (Whitbeck et al., 1999). Other parental monitoring constructs that were associated with sexual intercourse behavior included talking with friends' parents among a sample of 25% nonwhite and 75% white girls, but not in an analysis of boys in the AddHealth dataset (first sex up to age 16; McNeely et al., 2002), and parental supervision among a sample of Black and Hispanic boys, but not in an analysis of girls (first sex up to age 14, Smith, 1997).

There was little evidence that age of first intercourse is associated with parental control (e.g., coercion, withdrawal of privileges, disapproval of problem behavior). An association between age of first intercourse and control was found only in 2 of 8 studies (total  $N = 4340$ ), and in one study the association was isolated to males only (Upchurch et al., 1999). In the other, which studied harsh discipline practices, a significant association was found in univariate group comparisons only (Ellis et al., 2004). Additionally, in both of these studies, *earlier* onset of sexual intercourse was found among boys who reported relatively more parental overcontrol (Upchurch et al., 1999), and among adolescents of parents who reported relatively greater harsh discipline practices (Ellis et al., 2004).

In 3 of 5 studies (from 4 samples, total  $N = 3852$ ), age of first sexual intercourse was associated with parental communication about disapproval of sexual behavior (AddHealth data from two studies; McNeely et al., 2002; Sieving et al., 2000) and, in a very small study ( $N = 34$ ), observed discussion of parental values and beliefs (Romo et al., 2002). The three studies that reported moderate delaying effects were all classified as Middle and included substantial proportions of nonwhite adolescents, whereas the other 2 studies were classified as Early and included the only study with mostly white adolescents. In addition, one study reported an association for girls, but not among boys. Overall, this evidence suggests that parents' direct



communication about disapproval of adolescent sexual behavior and values is one family process that correlates with delaying onset of sexual intercourse until age 16 or later (Middle onset), and further research is needed to determine whether findings are equally applicable to girls and boys, and to multiple racial/ethnic groups.

### *Peer Factors*

Measures of peer relationships were placed into one of four categories -- dating behaviors, deviant or prosocial behaviors of friends, quality or number of peer relationships, and perceived attitudes of friends/peers towards sexual behavior (see Table 11). All of these categories of variables were associated with sexual behavior patterns and findings were generally consistent across studies, with the largest effects for dating behavior (e.g., adolescents with a history of dating reported earlier average onset of sexual intercourse compared to others).

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*Dating.* Dating relationships provide the context and opportunity for sexual intercourse. Hence, as would be expected, sexual intercourse behaviors had small to large associations with dating behaviors, median effect size = .22, with the median effect size = .37 in studies classified as Early and Middle. This was found in all 7 studies (from 5 samples; total  $N = 9955$ ) that included measures of adolescents' dating behaviors, and these associations remained significant even in one study that accounted for 27 other covariates. Depending on the particular measure of dating, the risk of having a history of sexual intercourse was increased by 2 to 5 times when adolescents were steady dating (Whitbeck et al., 1999), had a history of a romantic relationship (boys only, McNeely et al., 2002), had increasing frequency of dating without others present (girls only, Meschke et al., 2000), dated more frequently (boys and girls, Miller et al., 1997), and were currently dating (2 studies from AddHealth data; Longmore et al., 2004; Meier, 2003).

Dating behavior is clearly a correlate of sexual intercourse whether the study was classified as Early, Middle or Late, but associations are somewhat stronger in Early and Middle studies for both boys and girls, and for adolescents of diverse race/ethnicity.

*Deviant or prosocial friends.* In 8 studies ( $N = 5664$ ), having deviant or prosocial friends was included as a potential correlate of age of first sexual intercourse. In 6 studies, a significant association was reported. Generally, all effect sizes were small or moderate, median effect size = .22, but there was evidence of a stronger association of sexual behavior with peer problem behaviors, such having friends who used substances, among studies classified as Early as compared to those classified as Middle or Late. Most studies analyzed mixed gender groups and had mostly white adolescent participants, so it was not possible to determine if findings differed by gender or by racial/ethnic group.

*Quality and number of peer relationships.* In contrast to previous findings, 2 studies from 1 sample of mostly white adolescents showed that peer relationships may be more positive among girls who have first intercourse in middle adolescence; Crockett et al. (1996,  $N = 289$ ) reported that girls, but not boys, who had first sexual intercourse between about age 15 and 17 had more positive friendships than adolescents who were still abstinent in grade 12. Two other studies using national data sources, one classified as Middle and another Late, found no associations between sexual intercourse behavior, and the numbers of opposite-sex, same-sex or older friends (Miller et al., 1997,  $N = 759$ ; Mott et al., 1996,  $N = 450$ ).

*Perceptions of peers' attitudes and behaviors.* There were 2 studies of associations between age of first intercourse and adolescents' perceptions of their friends' attitudes and sexual behaviors. In 1 study, an association between early age of sexual intercourse onset (by age 13) and perceptions of peers' attitudes and sex behaviors was found in a diverse sample of Philadelphia adolescents (Kinsman et al., 1998,  $N = 1389$ ). In the other study classified as Late,

Carvajal et al. (1999,  $N = 830$ ) reported later age of first intercourse was associated with greater perception that peers support a delay.

### Summary, Discussion and Conclusions

In this review of 35 recent longitudinal studies, correlates of adolescents' sexual intercourse behaviors included physical development, problem behaviors, school-related behaviors and attitudes, sex-related attitudes, religious behavior and attitudes, mental health, and family and peer factors, including status and qualities of relationships. It was clear that age of first sexual intercourse (or patterns of sexual intercourse behavior over time) is correlated with a complicated assortment of distal and proximal individual characteristics, personal attitudes, and environmental factors. Also, evidence from the rapidly escalating base of longitudinal studies strongly suggests that some of the distal and proximal correlates differ by gender and race/ethnicity.

Some correlates also appeared weaker or stronger depending on whether studies were classified as Early (sexual intercourse by age 15 or before *only*), Middle (assessment of sexual intercourse up to age 18) or Late (knowledge of those who delayed until after age 18). This classification was very useful for showing that there are many correlates of adolescents' early onset of sexual intercourse, but some particular correlates, especially problem behaviors or symptomatology and school-related matters, may not be as relevant or may differ in strength when used to predict first sexual intercourse up to middle adolescence (Middle onset) or when accounting for delay of first sexual intercourse until after age 18 (Late onset) as compared to Early onset. Before summarizing these findings, we must stress that this review should be considered a point of departure for future studies, which have the opportunity to start with the purpose of uncovering patterns of distal and proximal correlates (i.e., pathways) associated with adolescent sexual intercourse, keeping in mind the possibility of more than one complex

pathway. Few studies included here had the ideal design for doing this, but future studies might demonstrate multiple pathways by comparing groups with similar sexual behavior patterns at different ages (e.g., age 13-14 compared to age 16-17) or by comparing the proximal correlates and sexual behavior patterns over time of adolescents with differing problems or social circumstances prior to adolescence.

A third method to reveal multiple pathways is to compare different patterns of sexual behaviors of a single age group. In one recent longitudinal study of young people from age 6 to 16, support for multiple developmental pathways associated with sexual behavior was found when the outcome was sexual partnering and contraceptive use patterns (Siebenbruner, Zimmer-Gembeck, & Egeland, 2007). There were correlates associated with risky sexual behaviors at age 16 that were somewhat different than the correlates of more responsible sexual behavior at age 16. Higher levels of and more significant deviant behaviors in childhood and adolescence, as well as involvement in dating, marked a pathway to high risk sexual behavior. The pathway to more responsible sexual behavior in adolescence was more strongly associated with physical development and social circumstance. Adolescents who were sexually active by age 16, but were more responsible than other sexually active youth did not have problem family and school profiles prior to age 12. These teenagers also engaged in other, milder problem behavior in adolescence (but not before), and did not engage in illicit drug use to the degree of those who engaged in more risky sexual behaviors.

### *Summary of Key Findings*

*Differences in correlates of early versus middle onset of sexual intercourse.* As anticipated, our classification of studies by age period was revealing of similarities and a few important differences between correlates associated with early onset of first sex (onset of sexual intercourse by age 15) as compared to studies that also included Middle onset (onset up to the

age 18). We also found other correlates of delaying sexual intercourse until after age 18 (Late onset). For simplicity throughout this review, we have referred to these sets of correlates as *pathways*. Key findings are summarized in Table 12.

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Regarding the identification of more than one pathway associated with adolescent sexual intercourse, the onset of sexual intercourse was more strongly associated with concurrent problem behaviors and symptomatology and a problem history in studies classified as Early compared to those classified as Middle or Late. The problem behaviors associated with early onset of sexual intercourse included (1) alcohol use and aggression for boys, (2) substance use and depressive symptoms for girls, and (3) lower school grades among those with very early onset of sexual behavior, especially among white adolescents.

The identification of stronger associations of a problem history and concurrent problem behaviors with early onset as compared to middle onset is consistent with Moffitt's (1993) description of the early-onset antisocial behavior type (see also Patterson, DeBaryshe, & Ramsey, 1989). Additionally, findings are consistent with Problem Behavior Theory (Jessor & Jessor, 1977), in which early onset of adolescent sexual behavior is considered a behavior with underlying influences that are shared with other problems behaviors.

Adolescents who have first sex in middle adolescence (between the ages of 16 and 18) rather than earlier have been found to engage in less sexual risk behavior, including having a lower number of different sexual partners and being more likely to use condoms and other contraception consistently (Smith, 1997; Tubman et al., 1996a; Siebenbruner et al., 2007). From this we could conclude that adolescents who have first sexual intercourse between the ages of 16 and 18 are relatively more responsible about this behavior than those who have first sexual

intercourse earlier. Our review shows, however, that personal and friend problem behaviors, such as alcohol use, are still correlated with sexual behavior whether initiated early or between the ages of 16 to 18. Nevertheless, these associations were more sporadic and weaker in Middle studies as compared to Early studies, suggesting that it is more difficult to show strong correlations between problems and onset of sex up to age 18, than to find this correlation when focused on early onset of sex only. Further, adolescents who have first sexual intercourse between the ages of 16 and 18 do *not* seem to have the school performance problems or lowered educational aspirations that are found among adolescents who have first intercourse earlier.

Somewhat paralleling the argument made by Moffitt (1993) when describing two pathways to adolescent antisocial behavior, we argue that an understanding of both proximal and distal correlates might yield two pathways to sexual behavior onset during adolescence. Taking some liberty to draw an analogy between antisocial behavior and sexual behavior, those who initiated sexual intercourse earlier would be expected to have the greatest history of problems, a greater range of difficulties, and an elevated concurrent level of problems than those who have first sex along with many of their peers (mid-adolescence, ages 16 to 18). In other words, the typical adolescent who has first sex in mid-adolescence may not have the same level of problem developmental history and current problems as an adolescent who had first sex at age 15 or earlier. This means that associations between age of first sex and problems should be stronger in Early versus Middle or Late studies, as was found here. Also, as was found in the current review, behavior and school problems would be most elevated in the group of adolescents classified as having early onset of sex and lower for those classified as middle or normative.

Adding further evidence to the possibility of two pathways to adolescent sexual behavior, there was some evidence of positive social adaptation among adolescents who had first sex between the ages of 16 and 18. These young people had more connections to school and had

more positive relationships with their peers than those who had first sexual intercourse either early or later (at age 18 or later).

*Similarities in correlates of early and middle onset of sexual intercourse.* Despite this evidence for two pathways to sexual behavior, most correlates of sexual intercourse patterns did *not* seem to depend on whether studies were classified as Early or Middle. In both groups of studies, positive associations with sexual intercourse onset were found for living in families without two biological parents, monitoring by parents, physical maturity, involvement in dating behavior, and permissive attitudes toward sexual behavior. In addition, similar levels of self-esteem were found when general (not domain-specific) measures of self-esteem were used and adolescents with early and middle adolescent onset were compared. Both groups also had elevated perceptions that their friends were having sex and were more supportive of this behavior than adolescents who delayed sexual intercourse until later. These findings illustrate that, as was emphasized by Rodgers and Rowe (1993) more than 10 years ago in their developmental model that incorporated social contagion and biology, the influence of adolescents' interactions with others who are potential sexual partners and the actual (or perceived) behaviors of their peer group are important influences on actual sexual intercourse patterns. Adolescent sexual behavior comes with or is part of multiple other developmental tasks of adolescence, such as developing close friendships outside the family, establishing romantic relationships, and developing the capacity for intimate relationships, and this seems to be the case regardless of whether sexual behavior is initiated in early or middle adolescence. It is important to note that middle adolescents who have first sex may be more accurate in their perceptions of the peer group; some behaviors and perceptions, such as dating and perceiving that many peers are having sex, are a more accurate reflection of the peer group when measured at ages 16 to 18 than earlier.

*Correlates of late onset of sexual intercourse.* Although additional research is needed to add to the studies that have followed participants beyond age 18, a second key finding of this review was the possibility that there are two other sets of correlates associated with delaying sexual intercourse until later (after about age 18), with one pathway more relevant for girls and one more relevant for boys. First, girls who delay report more commitment to religious beliefs, a friendship group that has similar commitments, and families who communicate clear disapproval of adolescent sexual behavior and values that do not support this behavior. Second, boys who delay the onset of sexual intercourse report some of these characteristics, but also may be relatively more anxious. Given the nature of adolescent dating interactions and dating gender roles, boys who are anxious or shy may be limited in their interactions with the other sex, dating and sexual behavior, and have restricted opportunities for these experiences, as well as being more isolated from social contagion by peers (Rodgers & Rowe, 1993).

Related to these findings, studies classified as Late also showed that delayed onset of sexual intercourse is associated with better school performance and more interest in school than adolescents with early onset. Delay also was associated with less alcohol use and delinquency, living with two biological parents, being more monitored by parents, having lower involvement in dating, having less permissive attitudes, and having friends who believe in postponing sexual behavior and who are not as likely to be sexually active. Findings for other potential correlates (e.g., pubertal maturation, self-esteem) were less clear, because of few studies with follow-up into the late teens or early 20s.

*Distal and proximal correlates of adolescent sexual intercourse.* Our inclusion of univariate and multivariate findings showed that the many correlates of adolescent sexual intercourse studied in longitudinal research may be best conceptualized as sets of distal and more proximal correlates. For example, although our conclusions are not without exceptions,



adolescent sexual intercourse was *not* significantly associated with family status and process when dating behavior, deviant peers or adolescent problem behavior were included as covariates (e.g., Whitbeck et al., 1999). Conversely, adolescent sexual behavior was more likely to be associated with family process measures in univariate analyses or when dating, deviance and problems were not included as covariates in multivariate analyses (e.g., Smith, 1997). It is easy to imagine how family factors may be more distal correlates of sexual behavior via the influence of family status and processes on adolescents' peer relationships, and individual behaviors and attitudes. Similarly, pubertal development may be a more distal correlate linked to sexual behavior via dating and other behaviors and attitudes (see studies by Feldman et al., 1995; Halpern et al., 1997, 1998, 1999; Zimmer-Gembeck, Siebenbruner, & Collins, 2004). Future research should aim towards testing path models that consider correlates as distal versus proximal, and attends to age of first sexual intercourse and/or other aspects of adolescent sexual behavior (e.g., accumulation of sexual partners over time).

#### *Race/Ethnicity and Gender*

*Racial/ethnic and gender differences.* There are some racial/ethnic differences in the age of first sexual intercourse, especially and maybe only among males. Further, associations between intercourse onset and other factors may be contingent upon race/ethnicity. Regarding racial/ethnic differences, Black males are at about 2.5 to 3.5 times the risk of earlier initiation of first sexual intercourse compared to white males, and Black males also, on average, have first sexual intercourse at an earlier age than other adolescents. There is some limited evidence that Asian American adolescents initiate sexual intercourse later and Hispanic adolescents initiate sexual intercourse at about the same time as white adolescents in the U.S., on average. Yet, the prospective studies reviewed did not often provide information to make firm conclusions about why this occurs. There may be some hints available in the one study conducted by Miller et al.

(1997). They reported a simple correlation between Black race and age of first sexual intercourse among boys ( $r = -.22$ ), but no significant association was found after accounting for eight family process factors, six family status variables (including some that are known to be more common among Blacks, such as single parenting), five adolescent behaviors, two biological factors (one for boys), one religion psychological factor, dating, and three characteristics of friends (including dating behavior). Accounting for this broad range of factors, while also including some examination of curvilinear relationships and interactions as was done in this study, seems to have provided some signposts to the mechanisms that could explain racial/ethnic differences in sexual behavior.

Although the sexual behavior gap between boys and girls may be perceived as closing (Grunbaum et al., 2002, 2004), males, especially Black males, still tend to have their first experiences of intercourse earlier than females. Yet, descriptive data from a national sample showed that this gender difference may not hold when only adolescents in romantic relationships are considered (Carver et al., 2004), and, consistent with racial/ethnic differences in sexual behavior for males, this review showed that the gender difference is larger when the study sample includes a higher percentage of Black adolescents. When gender and race/ethnicity findings are jointly considered, there is ample evidence to conclude that gender differences are more often found when the proportion of Black study participants is relatively higher, but the gender gap is narrowing in other racial/ethnic groups.

*Race/ethnicity and gender as moderators.* When it comes to race/ethnicity and gender as moderators of the association between age of first intercourse and other factors, it was studies of family processes, school attitudes, religion, and parent education that were most revealing. First, as others have noted when investigating associations between problem behaviors and parenting dimensions, such as monitoring and control (Forehand, Miller, Dutra, & Chance, 1997; Gorman-

Smith, Tolan, Zelli, & Huesmann, 1996; Lamborn, Dornbusch, & Steinberg, 1996; Walker-Barnes & Mason, 2001), the influence of parenting in adolescent sexual behavior may differ depending on race/ethnicity, particularly when comparing Black, Hispanic, and white boys. Previous studies suggest that monitoring and control are the parenting dimensions that may have different influences on boys' delinquency and related behaviors, with one study reporting no association or a positive association between problem behavior and parental control among Hispanic and white adolescents, but a negative association among Black adolescents (e.g., Walker-Barnes & Mason, 2001). The possibility that combinations of racial/ethnic background and gender moderate the association between adolescent behavior and parental monitoring or control should now be extended to the study of adolescent sexual behavior. One recent explanation of this finding is that adolescents with different racial/ethnic background attribute different affective meaning to parental controlling or coercive behaviors (Mason, Walker-Barnes, Tu, Simons, & Martinez-Arrue, 2004). For example, Black and white adolescents identify the same parenting behaviors as controlling, but Black compared to white adolescents are more likely to describe these behaviors as caring and supportive, sometimes reporting that these behaviors are more caring than controlling. Overall, family factors may be more important correlates of sexual behavior for nonwhite, especially Black and Hispanic, adolescents compared to white adolescents, but there have been too few studies of Asian American adolescents to draw any conclusions.

There was some evidence that sexual intercourse behavior may not covary with school attitudes and educational aspirations among males, especially Black males, and that sexual intercourse behavior may be more closely linked to (1) religious behavior and attitudes among nonwhite girls, and (2) parent education level among white girls. In addition, findings from one study (Costa et al., 1995) showed differences in Hispanic adolescents as compared to white

adolescents, suggesting that associations between sexual behavior and other factors may be reversed when associations are compared between racial/ethnic groups. Given these indications of racial/ethnic and gender differences in multiple domains, considering the combination of race/ethnicity and gender as a moderator of associations between sexual intercourse behavior and other factors in future studies is an important area for research.

#### *Current Findings Compared to Previous Reviews*

To compare our conclusions to those of previous reviews, we conducted a systematic search for reviews on this topic published between 1990 and 2005. Drawing from Barnes and Bero (1998) and West et al. (2002), we rated the comprehensiveness of each review (available from the first author). Three reviews had high scores (Goodson et al., 1997, Kirby, 2002; Kotchick et al., 2001). Each review covered a range of potential antecedents and concurrent correlates of adolescent sexual behavior. Goodson et al. (1997) completed a narrative summary of 49 cross-sectional and longitudinal U.S. studies of the predictors and correlates of early (or age of) onset of (presumably, heterosexual) sexual intercourse. Studies were published between January 1984 and December 1994. Kotchick et al. (2001) completed a narrative summary that included studies completed in the U.S. of persons under age 18. All studies were published between January 1990 and June 1999. Studies of predictors and correlates of a range of risky sexual behaviors, including inconsistent use of contraception, multiple sexual partners, and use of alcohol and drugs in conjunction with sexual activity, were included in this review of both cross-sectional and longitudinal studies. Kirby included studies published in 1975 or after of US adolescents, and the text notes that "...studies referenced in this article represent a sample of studies, not all studies, because hundreds of studies have examined the antecedents of sexual and contraceptive behavior and we clearly could not identify them all" (p. 474). Tables in this article summarized findings reviewed using symbols of + or – to indicate direction of associations; no

numbers were reported. In total, 84 antecedents of sexual debut, 51 antecedents of contraceptive use, and 61 antecedents of pregnancy were listed in these Tables.

Most often, our conclusions are in agreement with those about individual correlates of sexual behavior presented in these three previous comprehensive reviews. However, these previous reviews did not highlight the different correlates, patterns of covariation, and gender and racial/ethnic differences in the ways done in this review. No previous review has attended to age of participants in each study and other study characteristics as overtly as was done here by categorizing studies based on timing of assessment, follow-up length, and number of covariates, as well as attending to race/ethnicity and gender.

#### *Future Research Priorities*

Sexual interactions can be some of the most important and rewarding experiences in life. As it is among adults, many adolescents think about sex and/or intimacy frequently, and they spend more time with their peers today than ever before – they go to school with them, they work with them, and they spend a large amount of their leisure time with them (Furman & Shaffer, 2003; Graber et al., 1998; Mortimer, 2003; Richards, Crowe, Larson, & Swarr, 1998; Zimmer-Gembeck, 1999). In our view, this continues to make the study of the negative and positive aspects of sexuality in adolescence, and their developmental precursors, a priority area of research. Yet, it seems less important to continue to study age of first sexual intercourse without attention to the consideration of different sets of covariates that depend on age and other developmental features. The longitudinal studies reviewed here have provided much of the necessary preliminary information upon which researchers in this area can and have been building, but it is most important to investigate patterns of the many adolescent sexual behaviors over time to identify patterns that may be most detrimental to and beneficial for adolescent personal and relational development, to focus on the sexual behaviors that have more proximal

associations with health, and to begin to address the development of aspects of sexuality other than behavior (e.g., see Russell, 2005 and other papers in the same journal issue).

In our view, some aspects of sexuality that deserve more attention are the process of establishing a “regular” pattern of sexual intercourse and how particular risky sexual behaviors may change as these patterns emerge; predictors and correlates of sexual intercourse early in a new relationship versus waiting for the relationship to progress and show signs of longer term stability; the development of sexual self-conceptions and other intraindividual aspects of sexuality; positive aspects of sexuality including autonomous sexual decision-making; and a pattern of responsible versus less responsible sexual attitudes and/or behavior. Studies of the development of emotional, cognitive, and the positive aspects of sexuality during adolescence also are lacking and more attention to this area is needed (see Buzwell & Rosenthal, 1996; Graber et al., 1998; Russell, 2005). For example, Horne and Zimmer-Gembeck (2005, 2006) have examined the development of female sexual subjectivity, defined as sexual body-esteem, perceptions of entitlement to sexual desire and pleasure, and the ability to engage in sexual self-reflection to benefit from experience. Others have proposed definitions of positive sexuality that include learning about intimacy, learning about sexual roles and responsibilities, body self-esteem, understanding and adjustment to erotic feelings, and learning about societal standards or sexual expression (Bukowski, Sippola, & Brender, 1993; Buzwell & Rosenthal, 1996) and begun to empirically investigate these aspects of sexuality during adolescence and early adulthood.

Although this alludes to a long list of topics that deserve more research, we selected five areas to expand upon further. These areas include investigating pathways to sexual behavior at difference ages, different longitudinal designs and assessments prior to adolescence; considerations of adolescents as individual with goals and plans; continued focus on gender and race/ethnicity differences, and more investigation of gender and race/ethnicity as moderating

variables; attention to sexual relationships with the same sex; and testing of research questions that follow from evolutionary or other perspectives.

*Sexual behavior and developmental pathways.* In future longitudinal studies, it will be constructive to add to these findings by considering how the correlates of adolescent sexual behavior might be considered as proximal or distal factors in order to identify pathways to sexual behavior (see Zimmer-Gembeck et al., 2004). It also will be useful to examine interactions between such variables as family status and process, peer interactions, biology, gender, and race/ethnicity. Studies of such combinations of variables might improve our capacity to account for adolescent sexual behavior patterns. Interaction effects only were rarely included in models tested within the studies reviewed here. As stated by Rodgers and Rowe, “we conceptualize a complex web of social and societal influence, some acting to encourage sexual behavior and others acting to discourage the same behavior” (p. 480). It is easy to agree and to look forward to longitudinal, developmental studies that consider these issues more directly (see Udry & Bearman, 1998).

The longitudinal studies reviewed here organized data collection around participant age or grade level in school. Although other longitudinal designs would be very difficult, some might be considered. For example, data might be collected or reorganized around pubertal development in order to determine whether family relationships, for example, prior to a marker of pubertal transition (menstruation / the growth spurt) might predict later sexual behavior or whether it is changes in family or peer relationships after a pubertal transition that are important correlates. Other markers might also be important to consider, such as the onset of dating, particular experiences during first sexual intercourse, or the transition to high school. Studies that focus on transitions could be envisioned, such as identifying participants who move from inconsistent to consistent condom use or vice versa.

There is a need to begin future prospective studies when participants are in middle or late childhood rather than in early adolescence or later. Almost all of the longitudinal studies in this review first assessed participants at age 12 or later. Longitudinal studies of adolescent sexuality need to begin earlier in the life course; predictors were rarely assessed prior to onset of sexual behavior for all participants (e.g., adolescents who have first sex before age 14 were usually sexually active at the wave 1 assessment). This can be difficult given the various ethical constraints, and school or parental issues that exist, but to draw more firm conclusions about temporal associations between predictors and adolescent sexuality for all adolescents, studies of sexuality should begin prior to age 10, and ask about sexual interests and behavior as early as possible.

*Adolescent goals and decision-making.* It is important to add to this that adolescents are motivated, have goals and interests of their own, and can select their environments, and much of this begins in late childhood and early adolescence – before the first assessments included in most of the longitudinal studies reviewed here (Byrne, 1998, 2005). This means it is important to consider adolescents' interests, attitudes, and plans. However, few longitudinal studies have included measures of adolescents' attitudes and interests (with the exception of educational aspirations and sexual attitudes). Additionally, adolescents' current sexual environments may reflect their preferences and histories of experience, as may have been the case in a recent longitudinal study reporting correlations between hours of rap music viewing, the number of sexual partners, and contraceptive use (Wingood et al., 2003).

Adolescents' perceptions of their capacity for autonomous decision-making, their willingness to engage in sexual behavior, and their ways of making sexual decisions may be a fruitful area for future research. Only one study reviewed here had this focus, with promising results (Raffaelli & Crockett, 2003). In this study of a diverse national sample of adolescents,



those who reported they were higher in autonomous decision-making at age 12-13 had almost 5 times the odds of having sexual intercourse by age 15. This study highlights the important fact that adolescent sexual behavior does involve decision processes, regardless of whether these are deliberate and planful, whether they are made quickly based on intuition or whether they are emotional and impulsive.

Recent reviews of decision-making research, which attend to adolescent decision processes as well as life-span developmental patterns, suggest adolescents (as do adults) make deliberate decisions sometimes, but may be reactive and use intuition at many other times (for reviews see Firschoff, 2005; Reyna & Farley, 2006; Steinberg & Morris, 2001). As described in these reviews, studies of decision-making also show that adolescent experience with negative outcomes, ability to plan, future orientation, lack of impulsivity and perceptions of social norms may account for risky or adaptive behavior. All of these factors may be associated with some of the important correlates of sexual intercourse patterns found here, such as school attitudes, future educational plans, substance use, and perceived peer behavior and attitudes. Studies which include measures of decision-making, planning and similar factors might add to the current research on how adolescents' consider, plan, organize and make decisions about their own behaviors (Michels, Kropp, Eyre, & Halpern-Felsher, 2005). This information could be especially useful for identifying when decisions may follow a reasoned route or a reactive route. These are the two paths identified in dual-process decision-making models, such as the prototype/willingness model (Gibbons, Gerrard, Vande Lune, Wills, Brody, & Conger, 2004) and fuzzy-trace theory (Reyna & Farley, 2006). In the reasoned route, decisions are made using rational analysis, problem-solving and planning. In the reactive route, decisions are based more on qualitative impressions, less analysis and less deliberation. Adolescents have been shown to

use both routes to reach decisions and decision processes may change rapidly during adolescence.

*Gender and race/ethnicity.* Our review shows that analyses are most informative when they are more specific about when first sex occurred, and examine gender and race/ethnicity as factors that can change the correlates of sexual behavior. It is clear that researchers have taken the need to have diverse samples seriously in the area of adolescent sexual behavior, as there were about as many studies with more than 50% of adolescents from minority racial/ethnic groups as studies with more than 50% Caucasian adolescents. Future research on wider ranging adolescent sexual behaviors and other aspects of sexuality might follow this example.

Future investigations should not only investigate racial/ethnic and gender differences in sexual behavior and other factors, but also examine gender and race/ethnicity as moderators of associations between adolescent sexuality and potential predictor variables whenever possible. For example, sexual behavior may be most strongly associated with family process variables, such as parental monitoring, when participants are drawn from inner city and/or Black and Hispanic populations. It also is likely that biology, parental monitoring, communication about disapproval of sex, and other aspects of parent-adolescent relationships may be more strongly associated with delay of first sexual intercourse among girls as compared to boys (Graber et al., 1998). Overall, race/ethnicity-specific and gender-specific studies (or analyses) are most informative.

*Sexual behaviors with the same sex.* Finally, there was little attention to sexual behaviors with the same-sex in the longitudinal studies reviewed here. Although the studies that include adolescents who identify as gay, lesbian, bisexual, unsure, who report sexual behavior with the same-sex, or who report sexual attraction to the same sex are increasing in number, there remain few longitudinal studies that even identify how many of these young people were included. Of

course, this means that few studies have explicitly examined whether the correlates of sexual behavior are the same among these adolescents compared to other adolescents.

*Empirical tests of questions from evolutionary perspectives.* Parenthetically, it will be worth considering how the findings in this review can be interpreted within an evolutionary perspective on opposite sex interactions in adolescence (Buss & Schmitt, 1993; Weisfeld & Woodward, 2004). The large number of hypotheses and predictions that follow from Buss and Schmitt's Sexual Strategies Theory will need to incorporate findings from developmental studies of adolescent sexual behavior. In the published form, the theory proposed by Buss and Schmitt did not explicitly consider studies of adolescents and none of the studies reviewed here have drawn from this theory to propose and test hypotheses. It seems quite possible to develop hypotheses about the development of dating interactions and the emergence of adolescent sexual behaviors based on Sexual Strategies Theory. For example, do girls develop better capacities to identify when they are being pursued sexually by a boy, and do they get better at discerning when the boy is being deceiving about interest in a long-term versus a short-term sexual relationship? Do valued resources in a mate change with age? Do any of the hypotheses of Sexual Strategies Theory hold when relationship commitment and long-term mating may not be the main motivations for dating and sexual behavior among most adolescents (Brown, 1999; Connolly & Goldberg, 1999; Zimmer-Gembeck & Gallaty, 2006; Zimmer-Gembeck & Petherick, 2006)? Further consideration of these interesting issues awaits integration into future research.

#### *Implications of Limitations of Current Research for Designing Future Studies*

There are a number of other issues that stem from previous research limitations that should be considered when designing future longitudinal research on this and related topics of sexuality during adolescence, and drawing from the findings of this review. First, there was limited direct

replication of results across studies, there was inconsistent selection and measurement of variables, there were a range of study sampling techniques, and, as in all correlational research, there was the potential of confounding variables. Second, the retrospective nature of some of the data on sexual behavior and predictor variables was a limitation that should be considered when interpreting our findings. Adolescents' reports of their sexual behaviors always depended upon their memories, with researchers often asking participants to report information from the past year or even a much longer length of time. Although this is very difficult to avoid, reliance on memory about long periods of time could be minimized in future research by using innovative research designs with more frequent data collection (as some longitudinal studies reviewed here had accomplished). Further, the length of recall varied among participants in some studies and may have led to an association between age of participants or age of first sexual intercourse, and measurement accuracy. It is unknown whether these associations were embedded in some studies and, if so, how such an association would impact upon study findings.

Third, most of the longitudinal studies included in our review had a mixture of concurrent and prospective associations in analyses, and assessed predictor variables at a variety of ages. As a result, it was not always clear that unidirectional paths from measured predictors to onset or patterns of sexual intercourse were being examined. The "...logic of antecedents and consequences" (Meltzoff, 1998, p. 34) was not fixed, and most longitudinal studies reviewed here must be considered simultaneously cross-sectional and longitudinal in design. Directionality of effects were often difficult to delineate, and we cannot minimize the potential for bidirectional relationships or the significant influence of unmeasured variables on all correlates and sexual behavior outcomes. For example, these issues have been raised in the debates about whether alcohol use has a direct effect on risky sexual behavior, such as lack of condom use, or whether these risk behaviors simply covary or are explained by other variables, such as aspects of the

relational situation or personality characteristics (Halpern-Felsher, Millstein, & Ellen, 1996).

This also makes it important to be more cognizant of the ages of participants when assessments are completed. For example, it is very possible that social controls on sexual intercourse are relaxed with age, and experiences with relationships may differ by age. This means that there may be different predictors of sexual activity within particular age periods of adolescence. Future research might consider this possibility and be strategic about the age of participants when predictors are to be assessed.

Fourth, attrition from studies was higher than ideal in many studies. Proportions of participants not included in the primary analyses ranged from about 5% to about 75% with a median of about 40%. In fact, only a few studies lost fewer than 20% of participants. Many studies did compare participants included to those that were lost or excluded from analyses, and many reported some significant group differences. This suggests that results from a single study, and even in a review such as this one, may not generalize to all young people. When the number of participants lost or excluded is small, this may not be a concern, especially if losses are equal across sexual behavior groups or levels. It was rare, however, for this level of detail about participant loss to be presented leaving us to conclude that sample bias was likely an issue in a number of the studies reviewed here.

Fifth, most of the findings were based on adolescent report of all measures. This means that effect sizes may be biased upwards as a result of shared method variance. Although multiple studies reviewed here did manage to include parent and/or teacher report of some variables (e.g., Ellis et al., 2004) or used observational techniques (e.g., McBride et al., 2003), there were too few to allow for comparisons of findings based on different reporters to those based on only adolescent-report.

Sixth and finally, an inventory is needed to highlight what was not assessed in the longitudinal studies reviewed here. It is not possible to be comprehensive, but a few, potentially important, categories that were not included deserve mention. These include the influence and socializing effects of the media (Ward, 2003), the impact of siblings, and the possibility that adult responsibilities (such as paid work) may influence sexual behavior. In addition, none of these studies examined the mechanisms by which relationships with peers may influence sexual behavior, such as whether friends with similar interests and behaviors are selected or whether friends socialize each other toward particular behaviors.

### *Conclusion*

Sexual behaviors before and during adolescence emerge from a complex interplay of individual biological, and emotional, cognitive, and behavioral factors combined with the many levels of social forces that are important during particular phases of life. It is appropriate, therefore, that the studies reviewed here considered all of the elements. Given the importance of adolescent sexual development, it also was inspiring to see such a bulk of longitudinal research coming of age in the last 10 years. Future research can benefit from this by continuing to address some of the complexities of individual developmental histories when united with an understanding of sexual behavior, risk behavior, and, hopefully increasingly, the positive aspects of sexual development during adolescence. Since adolescence is a period of new experiences, and significant change and acquisition of skills, the road ahead should include differentiating what reflects experimentation and transient problems from that which is clearly maladaptive and predictive of ongoing and future problems. It is hoped that the different pathways to adolescent sexual behavior patterns described in this review supports continuing in this research direction.

To conclude, we believe it is necessary to consider the place of sexuality research within the field of adolescent development. Research on sexual behavior as a problem during

adolescence has been most prominent. This is not dissimilar to many areas of adolescent developmental research. In addition, with a few exceptions (e.g., Tolman et al., 2003), theories to guide the consideration of all aspects of sexual behavior and sexuality have not been available for developmentalists seeking to study adolescent sexuality as a normative process. There is general agreement that sexuality is one developmental task of adolescence and emerging adulthood, along with the developmental tasks of identity, autonomy and a capacity for intimacy. Yet, the emergence of sexual experimentation and other behaviors along with the development of a sexual self may be more than a developmental task. In our view sexuality may be a nucleus that brings together the other major developmental tasks of adolescence. It is a place where intimacy, identity, and autonomy converge. This may provide a context where adolescents and emerging adults can test their capacities and a place where selves, autonomy and intimacy are tested as a whole. This will continue to make the study of sexuality and sexual behavior interesting and important areas for developmental research, and, continuing to expand the domain of study to include the many facets of sexuality and the multiple developmental pathways underlying sexual behavior, the entire field of adolescent development may benefit.

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<sup>1</sup>We refer to adolescent biological sex as “gender” in the remaining sections to avoid confusion with sexual behavior.