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Associations Between Early First Sexual Intercourse and Later Sexual and Reproductive Outcomes: A Systematic Review of Population-Based Data

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Abstract The assumption that early sexual debut leads to adverse outcomes has been used as justification for sexual health interventions and policies aimed at delaying sexual initiation, yet research in the area has been limited. This review identified and synthesized published literature on the association between early first sexual intercourse and later sexual/reproductive outcomes. Literature searches were conducted in Medline, Embase, PsycINFO, and Current Contents. In all, 65 citations met the selection criteria (industrialized, population-based studies). By far the most common sexual behavior to have been investigated has been sexual partners. Studies consistently reported early first intercourse to be associated with more recent, lifetime, and concurrent sexual partners. Early initiators were also more likely to participate in a wider range of sexual practices and report increased sexual satisfaction (among men). Furthermore, early first intercourse, in some studies, was shown to increase the risk of teen pregnancies, teen births, and having an abortion, while findings on STIs and contraceptive use have been mixed. These findings, however, must be interpreted with caution due to methodological problems and limitations present in the research, including a lack of consensus on what constitutes early sexual intercourse and inconsistencies and problems with analyses.

Keywords First sexual intercourse · Sexual behavior · Reproductive outcomes

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Introduction

First sexual intercourse usually takes place during adolescence or young adulthood and is an important milestone, marking the beginning of an individual's sexual and reproductive life. Large population-based sexual health studies in Great Britain (Johnson, Wadsworth, Wellings, & Field, 1994), France (Bajos et al., 2010; Bozon, 1996), Spain (de Sanjose et al., 2008), Norway (Stigum, Samuelsen, & Traeen, 2010), various European countries (Bozon & Kontula, 1998), and Australia (Rissel, Richters, Grulich, de Visser, & Smith, 2003), together with a cross-temporal meta-analysis of 530 studies in the US (Wells & Twenge, 2005), have all reported a decrease in median age at first intercourse over the past 50–60 years, particularly among young women. Median age at first intercourse, however, appears to have stabilized in more recent birth cohorts.

Early first sexual intercourse is a public health issue for a number of reasons. Sex that occurs at earlier ages is less likely to be consensual or wanted (Abma, Driscoll, & Moore, 1998; Dickson, Paul, Herbison, & Silva, 1998; Houts, 2005; Martinez, Copen, & Abma, 2011) and less likely to involve the use of contraception (Dye & Upchurch, 2006; Manlove, Ikramullah, Mincieli, Holcombe, & Danish, 2009; Manning, Longmore, & Giordano, 2000; Martinez et al., 2011; Wellings et al., 2001). Early first sexual intercourse has also been proposed as an important marker of later sexual and reproductive health (Greenberg, Magder, & Aral, 1992).

Associations between early first sexual intercourse and later sexual and reproductive outcomes have been investigated using data from a number of large population-based studies. In the United States, Sandfort, Orr, Hirsch, and Santelli (2008) found men and women with early first intercourse (25 % of participants) reported more sexual partners, were more likely to report risky partners, sex under the influence of drugs, and a history of sexually transmitted infections (STIs). Men who reported early

first sexual intercourse were also more likely to report sexual arousal problems, erectile problems, and orgasm problem. In Australia, Rissel et al. (2003) found those reporting early first intercourse (<16 years) were more likely to report a greater number of sexual partners, more likely to have ever had oral sex, anal sex, and homosexual sex, and to have been paid for sex. Men and women who had sex before the age of 16 were also more likely to have ever been diagnosed with an STI compared with those who reported first intercourse at an older age. Among men, early starters were more likely to have ever paid for sex. Not all studies, however, have reported such findings. Using data from the Longitudinal Study of Adolescent Health (United States, 18–26 years), Kaestle, Halpern, Miller, and Ford (2005) found being younger at first sex was associated with increased odds of testing positive for an STI among younger participants. The association, however, diminished with increasing current age and was no longer evident in participants over the age of 23.

Empirically, little is known about why early first sexual intercourse might be associated with later behaviors or outcomes. Furthermore, connections between earlier (or later) sexual experiences and subsequent sexual and reproductive health have not been well theorized; the majority of research to date has been atheoretical. Theories that have been suggested in the literature include life course theory (Kaestle et al., 2005), script theory (Else-Quest, Hyde, & Delamater, 2005; Kaestle et al., 2005), and problem behavior theory (Sneed, 2009). Life course perspectives suggest that timing of events and transitions are important (Elder, 1985). When important milestones, such as first sexual intercourse, occur "off-time" (i.e., too early or too late) this can have long-term consequences for later life or health. Script theory proposes that sexual schemas or scripts are developed prior to and during early sexual experiences. These scripts influence how, when, where, and why people have sex (Gagnon & Simon, 1973; Laumann, Gagnon, Michael, & Michaels, 1994). Those who have sex early may form non-normative sexual scripts that could have negative consequences later on. Finally, Sneed (2009) suggested problem behavior theory as a way to explain the association between early first sex and increased risk of using drugs or alcohol before last sex. Problem behavior theory proposes socially defined problem behaviors tend to coexist in adolescents (Jessor & Jessor, 1977). Sneed (2009) suggested that "Early sexual debut and substance use are considered part of a group of externalizing behaviors that may co-occur as part of an underlying etiological cause" (p. 1398).

From a public policy perspective, the assumption that early sexual debut leads to adverse outcomes, such as teen pregnancy and STIs, has been used as justification for sexual health interventions and policies aimed at delaying sexual initiation. Over $1.5 billion has been spent on programs teaching abstinence in the US alone and the 2008 US budget included $204 million for abstinence programs despite funding cuts for HIV/AIDS and STI prevention (Hampton, 2008; U.S. Government Printing Office, 2008). The efficacy of these programs, however, has been questioned (Bennett & Assefi, 2005; Kirby, 2001, 2008; Trenholm et al., 2007; Underhill, Montgomery, & Operario, 2007).

Research on the associations between early first sexual intercourse and later sexual and reproductive outcomes has important implications for sexual health interventions, sexual education, public policy, and sexual and reproductive health into adulthood. The literature available, however, has been surprisingly sparse and plagued by a number of important methodological problems, including what constitutes early first sexual intercourse. Given this, the following systematic review has two aims: (1) to identify and synthesize published empirical literature from large population-based studies in industrialized countries and (2) to identify and discuss a number of the main methodological problems and limitations in the research available. To the best of our knowledge, this is the first review to comprehensively investigate and discuss literature in the area.

Method

Data Sources and Search Strategy

No review protocol exists in the area. Literature searches were conducted using electronic databases; Medline, Embase, PsycINFO, and Current Contents. Due to the nature/lack of standardisation of MeSH terms in the field it was decided a title and abstract search was the most appropriate way to proceed.

A number of preliminary searches were conducted to help generate a list of appropriate search terms. The final search strategy involved a title and abstract search of the following terms: ("first sex*" OR "first coit*" OR "first intercourse" OR "sex* debut" OR "coit* debut" OR "early sex*" OR "early coit*" OR "early intercourse" OR "early initiat*" OR "sex* initiat*"). Where possible results were limited to human studies and studies about sexual intercourse, using the MeSH term "sexual behavior" (exploded). The review was subsequently updated twice using the same search terms but with restrictions on the date citations were uploaded to each database (Fields used; Medline-entry date, Embase-date delivered, PsycINFO-update code, Current Contents-entry week).

Hand searches were also conducted from 2000 to 2012 on the following key journals; *American Journal of Epidemiology, American Journal of Public Health, Archives of Sexual Behavior, Journal of Adolescent Health, Journal of Infectious Diseases, Journal of Family and Marriage, Journal of Sex Research, Lancet, Perspectives on Sexual and Reproductive Health* (formerly known as *Family Planning Perspectives), Sexually Transmitted Diseases* and *Sexually Transmitted Infections*. In addition, reference lists of the included citations were searched to identify any citations the above mention strategy failed to locate. Unpublished work and gray literature (e.g., conference proceedings) were not actively located in the search strategy.

Study Selection and Inclusion Criteria

An initial screening removed duplicate references, non-human studies (e.g., animal, plant), studies not in English, and those from non-peer reviewed sources (e.g., editorials, theses) with the exception of published books. Potentially relevant references were then identified by titles and abstracts. Next, citations investigating outcomes other than sexual or reproductive outcomes were removed.

Geographic and sampling restrictions were also placed on the review. In order to minimise heterogeneity, only population-based studies from Industrialised countries (defined as North America, Western Europe, Australia and New Zealand) were included. The geographic restrictions were chosen due to large regional variations in sexual behavior (see Wellings et al. [2006] comprehensive review of global sexual behavior, including global variations in median age at first sex). Studies reporting on clinical and convenience samples were also excluded due to their over-representation of high-risk populations and exclusion of large proportions of the population (for example men, those with lower socioeconomic status, those not experiencing problems).

In addition to sampling restrictions, only studies investigating first vaginal intercourse were included. The current review excluded literature (three papers) that defined first sexual intercourse as including vaginal, and/or oral, and/or anal sex (Cubbins & Tanfer, 2000; Davis & Lay-Yee, 1999; Stone et al., 2002), due to uncertainty surrounding the temporal ordering. Not knowing the temporal ordering of these sexual practices is a problem as the different practices carry different meanings and potential outcomes/consequences (e.g., pregnancy). Furthermore, there are data to suggest the temporal ordering of vaginal and oral sex may be changing, with first oral sex occurring much closer to first vaginal intercourse in younger populations (Reese, Haydon, Herring, & Halpern, 2012; Rissel et al., 2003; Song & Halpern-Felsher, 2011). Studies were also excluded if definitions of age at first sexual intercourse were dependent on other variables which were not relevant to the research question (e.g., if sex was voluntary) (Magnusson, Masho, & Lapane, 2011; Paik, 2011) or the age of the partner (Leitenberg & Saltzman, 2000; Ryan, Franzetta, Manlove, & Schelar, 2008).

Methodological quality of the studies was assessed but was not an exclusion criterion. Although this is usually an important part of a systematic review, it contradicted the main aims of the review: to identify published literature in the area and to identify and discuss methodological problems and limitations with current understandings of the associations between early first sexual intercourse and later sexual and reproductive outcomes.

In summary, to meet the inclusion criteria, citations needed to be published, population-based, from industrialized countries and not include oral or anal sex in definitions of first sexual intercourse.

Two independent reviewers content coded a selection of citations. Approximately 11 % of included studies were double-coded; any discrepancies were discussed with a third reviewer until a consensus was reached. Using a standardized form created by the first author, relevant data were extracted from all papers which complied with the inclusion criteria.

Results

Search Results

Searches of the electronic databases were performed on 29 August 2011; Fig. 1 displays a summary of study selection process. In all, 43 citations met the inclusion criteria from the original search (records identified through database searches). Two additional searches were undertaken on 22 June 2012 and 6 May 2013 to locate citations available until the end of 2012. The first of these searches located citations from 30 August 2011 to 31 December 2011 and the second located citations from 1 January 2012 to 31 December 2012. These searches resulted in an additional three citations and four citations, respectively. Searches of key journals and reference lists returned an additional 15 citations. In all, 65 citations met the criteria for inclusion in the review.

The literature that was located comprised two different types of citations; those which explicitly set out to test the association between age at first sexual intercourse and sexual/reproductive outcomes (referred to as primary studies/papers) and secondly, studies that in the process of examining correlates of a sexual or reproductive outcome, included age at first intercourse as one of a number of demographic or sexual behavior predictors (i.e., the association between age at first sex and the outcomes was not the main focus of the research, referred to as secondary studies or papers). In total, primary papers accounted for less than one in five citations (12/65).

The review will begin by summarizing the literature. This will be followed by a discussion of some of the problems with current understandings of the associations between early first sexual intercourse and later sexual and reproductive outcomes.

Sexual Outcomes

Early first sexual intercourse has been linked to a number of subsequent sexual behaviors including; sexual partners, sexual practices and repertoire, sexual satisfaction or dysfunction, and relationship formation and dissolution. Details of the papers used in the current review can be found in Tables 1 (primary papers) and 2 (secondary papers).

Sexual Partners

The most common sexual outcome to be investigated has been the number and/or type of sexual partners, with eight primary studies and fourteen secondary studies. Overall, early initiators

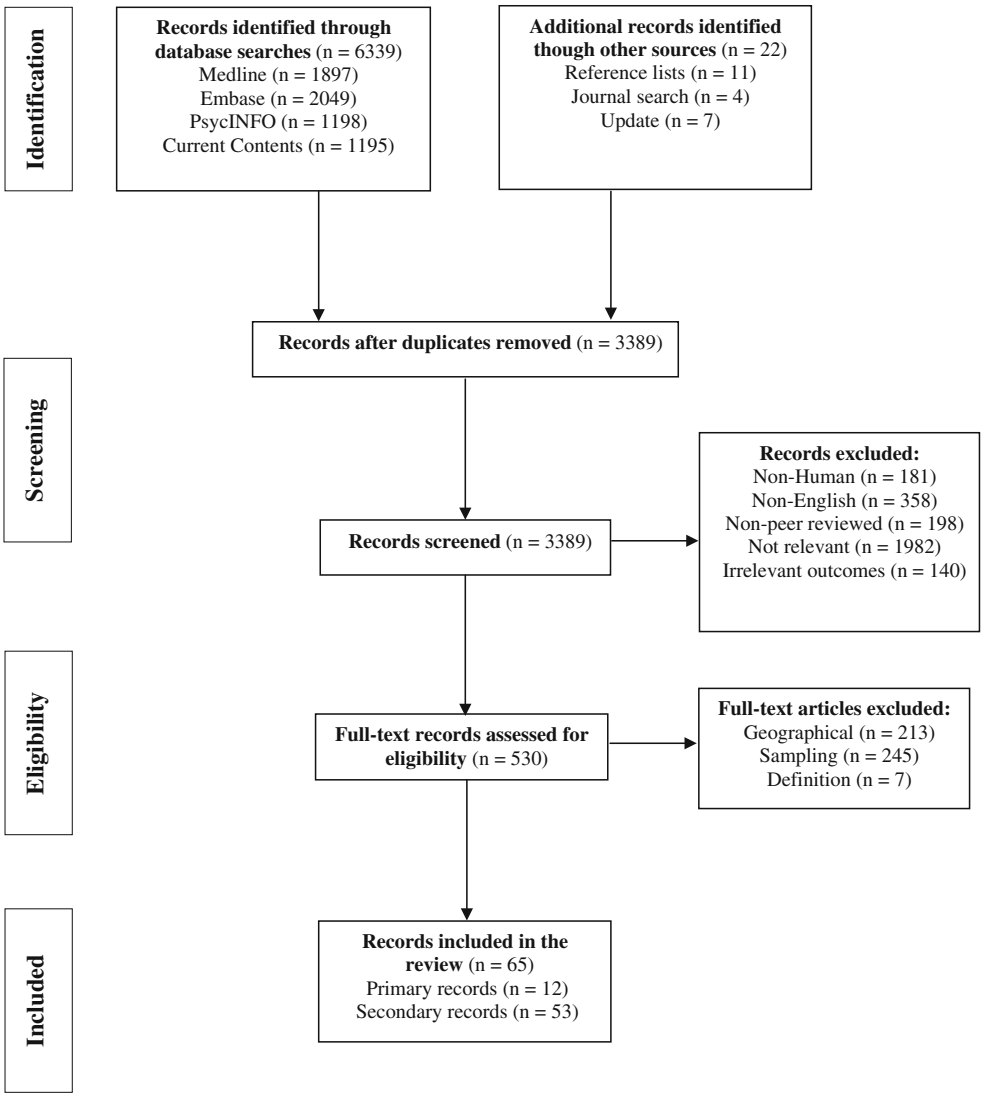

Fig. 1 PRISMA flow diagram showing identification and selection process of eligible studies

have been found to report more sexual partners over a variety of time frames and definitions of multiple sexual partners. More partners were reported over recent periods, including 3 months (Santelli, Brener, Lowry, Bhatt, & Zabin, 1998; Seidman, Mosher, & Aral, 1992, 1994), 6 months (Buttmann, Nielsen, Munk, Liaw, & Kjaer, 2011; Olesen et al., 2012), and 12 months (Bozon, 1996; Bozon & Kontula, 1998; Humblet, Paul, & Dickson, 2003; Johnson et al., 1994; Rissel et al., 2003; Sandfort et al., 2008). Early first sexual intercourse was also associated with reporting more partners over longer periods, including 3 years (Stigum, Magnus, Harris, Samuelsen, & Bakketeig, 1997), 5 years (Sandfort et al., 2008), and across a lifetime (Baumann, Belanger, Akre, & Suris, 2011; Bozon, 1996; Buttmann et al., 2011; de Sanjose et al., 2008; Jensen et al., 2011; Johnson et al., 1994; Olesen et al., 2012; Rissel et al., 2003; Santelli et al., 1998; Sneed, 2009).

Early first sexual intercourse was found to be associated with increased reporting of concurrent sexual partners among women but not men in the US (Adimora et al., 2002; Adimora, Schoenbach, & Doherty, 2007; Adimora, Schoenbach, Taylor, Khan, & Schwartz, 2011), and among men and women currently living with a partner in Norway (Traeen & Stigum, 1998). In France, participants who reported early first sex and were living in a couple for at least a year reported a higher proportion of having two or more partners in the past year compared with those also living in a couple for at least 1 year and who had first sex later (with the exception of women aged 50–69 years) (Bozon, 1996). Finally, a US study found early initiators were also more likely to report risky sexual partners (defined as injecting-drug-using partner or HIV-positive partner) (Sandfort et al., 2008).

Not all research, however, supports the association between having sex early and reporting more sexual partners. In one study

Table 1 Primary papers estimating the associations between early first sexual intercourse and sexual outcomes

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Baumann et al. (2011)	Switzerland Swiss Multicenter Adolescent Survey on Health (SMASH-02, 2002)	Men and women, aged 16–20, in post-mandatory school (public high schools and vocational schools), ever engaged in vaginal intercourse ($n = 4388$) 60 % sexually active	Categorical: <16, ≥16 years 33.5 % <16 years	Logistic regression Adjusted for nationality, residency, academic track, parental education, relationship to parents, school context, pubertal timing and sexual abuse	Lifetime sexual partners	Early sexual intercourse was associated with reporting four or more sexual partners when adjusting for age among men and women Men AOR (age) 4.41 (3.26–5.97) Women AOR (age) 6.33 (4.58–8.75) Association was no longer significant among men when adjusting for years since onset of sexual intercourse instead of age. The association remained significant among women with lower AORs Men AOR (YSSI) 1.15 (0.81–1.65) Women AOR (YSSI) 1.47 (1.06–2.04)
Bozon and Kontula (1998)	Europe—Finland, France, Germany West, Great Britain, Netherlands. Switzerland (Belgium excluded) (see p 5–7 & 14–15 for details, 1980s–90s)	Men and women, aged 18–49, ever had sexual intercourse. (see reference for sample sizes) % sexually active not given	Categorical: early (≤16), intermediate (17–18), late (19–20) and very late (21+ years) Not given	Tabulations (proportions)	More than one partners in the last year Intercourse two or more times a week Practice of anal sex (in life or in the last 12 months)	In Finland, France, Germany West, Great Britain and the Netherlands, men and women who had first intercourse late reported fewer partners in the preceding year Early first intercourse was associated with higher frequency of intercourse in later life in the Netherlands, Germany West and French males. The pattern was less marked in Switzerland and Great Britain and was not found in women from France and Finland Anal sex was more common among men and women who reported early first intercourse in Finland, France, Germany West, Great Britain and the Netherlands

Table 1 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Bozon (1996)	France Analysis of sexual behavior in France (1991–92)	Men and women, aged 25–69 ($n = 3407$) Total % sexually active not given	Categorical: early, neither early nor late, late. Calculated separately for men and women and for young generations (18–34 years), intermediate generations (35–49 years) and oldest generations (50–69 years) correspond roughly to first and third quartiles (see p. 150–151) 22–30 % early	Tabulations (proportions)	Mean interval in years between first sexual intercourse and first couple formation Mean number of sexual partners (lifetime) Legal status of first couple formed by individuals (only among 30–44 year olds) Lived in a couple at least twice Only one sexual partner Multi-partnered (last 12 months) among those living in a couple for at least 1 year and among those not living in a couple or who have lived in a couple for less than 1 year Frequency of sexual intercourse among those living in a couple for at least 12 months (mean monthly) Experienced fellatio at least once (and anal sex) Reported having a very satisfying sex life	Men and women who experienced early first sexual intercourse had much longer intervals between first intercourse and couple formation. Overall, men had a longer mean interval than women (see Table 7, p. 154) Men and women who experienced early first sexual intercourse, on average, reported more sexual partners during their lifetime. Overall men reported more sexual partners than women and greater differences between those who had sex early and those who had sex late (see Table 12, p. 164) Men aged 30–44 years who initiated sex early reported lower proportions of immediately marrying when they form their first couple and high proportions of cohabitating for at least a year before marrying. Among women aged 30–44 years, early initiators reported higher levels of immediately marrying the partner they form a couple with and reported lower levels of never forming a couple (see Table 13, p. 165) With the exception of women aged 50–59, a higher proportions of men and women who had sex early went on to live in a couple at least twice (see Table 14, p. 166) A much lower proportion of men and women who initiated sex early reported only having one sexual partner compared with neither early nor late or late initiators (see Table 15, p. 167)

Table 1 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
						With the exception of women aged 50–69, higher proportions of men and women who reported sex early had multiple partners during the past 12 months. This was found separately for both those living in a couple for at least 1 year and among those not living in a couple/lived in a couple for less than 12 months (see Tables 16 & 17, p. 168) Higher mean monthly frequency of sexual intercourse was reported by early initiators living in a couple for at least 12 months compared with men or women who initiated sex late (see Table 18, p. 170) With the exception of women aged 50–59, a higher proportion of men and women who had sex early reported having experienced fellatio at least once (see Table 19, p. 170) In each generation, men who initiation sex early report higher proportions of having a very satisfying sex life. These differences were not found among women (see Table 20, p. 171)
de Sanjose et al. (2008)	Spain The AFRODITA study (2005)	Women, aged 18–70, sexually active ($n = 5789$) 92.2 % sexually active	Categorical: ≤17, 18+ years 2.5–36.5 % ≤17 years	Logistic regression Adjusted for age, residency, socio-economic level, screening cytology and all other variables tested	Lifetime sexual partners	Early first sex associated with reporting more sexual partners 1 partner-reference 2–4 partners OR 2.13 (1.79–2.53) ≥5 partner OR 4.82 (3.71–6.28)
Else-Quest et al. (2005)	United States National Health and Social Life Survey (1992)	Men and women, aged 18–59, who were sexually active and whose first intercourse was not coerced ($n = 2558$) % sexually active not given	Categorical (early, average, late): Men: ≤15, 16–18, 19+ years Women: ≤16, 17–19, 20+ years Early: 29·1 % of sexually experienced sample, 27.4 % of analysis sample	Multivariate analysis of covariance	Sexual dysfunction (mean 7 items)	Age at first sex was not associated with sexual dysfunction

Table 1 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Miller and Heaton (1991)	United States National Survey of Family Growth (Cycle III, 1982)	Women, aged 15–44 years ($n = 7432$) % sexually active not given	Categorical: 12–13, 14–15, 16–17, 18–19, 20+, no premarital intercourse (Inc. virgins) 2.4 % white, non-Hispanic and 7.8 % Blacks reported 12–13 years	Survival analysis Adjusted for region, mother's education, father's education, age, age at menarche, religion, family structure at age 14, and contraceptive use at first intercourse	Family formation (marriage or premarital birth)	Marriage—For White participants, those who reported early first sex (12–13 years), initially had lower rates of marriage which increased during the late teens. These women also reported longer intervals between first sex and marriage, however were more likely to marry young (before the age of 20). Similar patterns were reported for Black women but with slightly lower rates of marriage Births—Higher rates of premarital childbearing among those who reported first sex between 12–13 years (White participants). For Blacks, higher overall rates of childbearing, initial rate of childbearing increased with older age at first intercourse. Age specific rates similar between those who began early and in their mid teens. Those who began in their late teens initially had a high risk of childbearing which declined with age
Olesen et al. (2012)	Denmark, Iceland, Norway and Sweden (2004–05)	Women, aged 18–45 years, sexually active ($n = 64659$) Approximately 96.2 % sexually active	Categorical: ≤14, 15+ years 11.6 % ≤14 years	Logistic regression Adjusted for age as a continuous variable, country of residence and years of education	Lifetime sexual partners Recent sexual partners (past 6 months)	Young age at first sexual intercourse associated with having more than 10 lifetime partners OR 3.79 (3.60–4.00) Young age at first sexual intercourse associated with reporting 2 or more new sexual partners in the past 6 months OR 1.67 (1.54–1.82)

Table 1 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Rissel et al. (2003)	Australia The Australian Study of Health and Relationships (2001–02)	Men and women, aged 16–59, ever had vaginal intercourse ($n = 18612$) 92.2 % men and 92.3 % women ever vaginal intercourse	Categorical: <16, 16+ years Men: 21.5 % <16 years Women: 13.4 % <16 years	Logistic regression	Sexual partners-lifetime Sexual partners—last year Ever had oral sex Ever had anal sex Ever had homosexual sex Ever paid for sex Ever been paid for sex Levels of physical pleasure in sex Levels of emotional satisfaction	Early first vaginal intercourse associated with: Greater number of lifetime partners Men: $p < 0.001$ Women: $p = 0.011$ Greater number of sexual partners in the last year Men: $p = 0.001$ Women: $p = 0.007$ More likely to ever report oral sex Men: OR 1.90 (1.57–2.30) Women: OR 2.33 (1.94–2.80) More likely to ever report anal sex Men: OR 2.14 (1.86–2.47) Women: OR 2.67 (2.25–3.16) More likely to ever report homosexual experience Men: OR 1.44 (1.07–1.94) Women: OR 4.33 (3.54–5.31) More likely to report ever paying for sex Men: OR 1.61 (1.22–2.11) Women: no association More likely to have ever been paid for sex Men: OR 3.10 (1.41–6.80) Women: OR 6.40 (3.11–13.20) More likely to report current relationship was extremely physically pleasurable Men: $p = 0.006$ Women: no association More likely to report current relationship to be extremely or moderately emotionally satisfying, and less likely to report it was very emotionally satisfying Men: $p = 0.004$. More likely to report t current relationship to be moderately emotionally satisfying and less likely to report their relationship to be very emotionally satisfying Women: $p = 0.002$

Table 1 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Sandfort et al. (2008)	United States National Sexual Health Survey (1995–96)	Men and women, aged 18+, who resided in the 48 contiguous states, sexually active ($n = 8466$) % sexually active not given	Categorical: early (fourth quartile), normative (second and third quartiles), late (first quartile) Roughly 25 % early	Logistic and linear regression Adjusted for race/ethnicity, educational level, place of residence when growing up, religiosity, migration status, age (as an indicator of potential cohort effects), history of non-consensual sexual experiences, first orgasm as solo or social experience, and any other sexual involvement before first sexual intercourse.	Sexual partners in the preceding year Sexual partners in the preceding 5 years Risky partners in the preceding year Risky partners in the preceding 5 years Sex under the influence of alcohol or drugs Relationship solidarity Sexual relationship satisfaction Sexual arousal problems Erectile problems Orgasm problems	Early first sexual intercourse associated with: More sexual partners in the past year Men: $r = 0.20$ Women: $r = 0.09$ More sexual partners in the past 5 years Men: $r = 0.70$ Women: $r = 0.28$ More likely to report risky partners in the preceding year Men: OR 1.27 ($p < 0.10$) Women: OR 1.14 More likely to report risky partners in the preceding 5 years Men: OR 1.33 Women: OR 1.43 More likely to report sex under the influence of alcohol or drugs Men: OR 1.77 Women: OR 1.69 Relationship solidarity not associated with early first sexual intercourse Sexual relationship satisfaction not associated with early first sexual intercourse More likely to report sexual arousal problems Men: OR 1.58 Women: no association More likely to report erectile problems Men: OR 1.83 More likely to report orgasm problems Men: OR 2.34 Women: no association

Table 1 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Sneed (2009)	United States Youth Risk Behavior Survey (2007)	Men and women 9th–12th grade Only those aged 16–18 who reported having sex at least once in their lifetime ($n = 5315$) % sexually active not given	Categorical: <13, 13+ years Men: 16 % <13 years Women: 6 % <13 years	Logistic regression, subgroup analysis by gender and ethnicity Adjusted for age	Sexual partners Sex in the past 3 months Drank/drugs before last sex	Early first sexual intercourse associated with: More likely to report four or more sex partners Men: OR 5.85 (3.98–8.60) Women: OR 4.50 (2.84–7.13) More/less likely to report sex in the past 3 months Men: OR 1.71 (1.16–2.51) (more) Women: OR 0.57 (0.37–0.88) (less) More likely to drink alcohol or use drugs before last intercourse Men: OR 2.24 (1.53–3.29) Women: OR 1.90 (1.02–3.53)

the association between early first sexual intercourse and number of lifetime partners was greatly reduced and became non-significant among men when adjusted for years since the onset of sexual activity (instead of age) (Baumann et al., 2011). Furthermore, data from Wave 3 (2001–2002) of the National Longitudinal Study of Adolescent Health found no association between age at first intercourse and number of partners in the last year (Scott et al., 2011). Using the same data, Kan, Cheng, Landale, and McHale (2010) investigated sexual relationships at each age. Overall, being older at first intercourse was associated with having fewer partners by the age of 17, yet these participants reported larger increases in numbers of partners over time compared with early initiators.

Sexual Practices and Repertoire There is also evidence to suggest sexual practices and repertoires differ between those who initiate sex at an early age and those who do not. Far less research, however, exists for these sexual practices compared with that for sexual partners. Of the five primary and three secondary papers which were located, early initiators were more likely to participate in a wider range of practices, such as oral sex (Bozon, 1996; Rissel et al., 2003) (with the exception of women in France), anal sex (Bozon & Kontula, 1998; Rissel et al., 2003), have sex with a same sex partner, and consume drugs or alcohol before or during intercourse (Sandfort et al., 2008; Sneed, 2009).

Men and women who had sex early were also more likely to have ever been paid for sex (Rissel et al., 2003), while early initiating men were more likely to have paid for sex (Belza et al., 2008; Buttmann et al., 2011; Rissel et al., 2003; Schei & Stigum, 2010). When a large Danish study stratified their findings by age, however, early first sexual intercourse was significantly associated with men having sexual intercourse with a commercial sex worker in the oldest age group (36–45 years), but not among younger participants (18–25 years, 26–35 years) (Buttmann et al., 2011). The only study reporting on women and paying for sex found no differences according to when they first had sexual intercourse (Rissel et al., 2003).

Early initiators living in a couple also reported, on average, having sex more often (Bozon, 1996) yet findings on frequency of sex were far less consistent in a number of European studies conducted in the 1990s, with early initiators reporting more frequent sex in some locations but not others (Bozon & Kontula, 1998). Mixed findings were also reported in a US adolescent study, with young men who experienced intercourse early being more likely to report sex in the past 3 months, while early initiating young women were less likely to report sex in this period compared with those who reported first sex at a later age (Sneed, 2009).

Sexual Satisfaction and Dysfunction Only two primary papers have investigated sexual dysfunction or sexual difficulties; no secondary papers were located. In one study a higher frequency

Table 2 Secondary papers estimating the associations between early first sexual intercourse and sexual outcomes

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Multiple outcomes						
Buttmann et al. (2011)	Denmark (2006–07)	Men, aged 18–45 ($n = 22410$) 95.9 % sexually active	Categorical: ≤14, ≥15 years Not given	Logistic regression Adjusted for age as a continuous variable, marital status, education level, area of residence, smoking, alcohol consumption Having had sexual intercourse with a commercial sex worker was also adjusted for lifetime sexual partners and number of new partners in the past 6 months	Lifetime sexual partners Sexual partners in the past 6 months Ever having sexual intercourse with a commercial sex worker	Early first intercourse was associated with reporting >8 female lifetime sexual partners All ages AOR: 4.26 (3.86–4.72) 18–25 years AOR: 5.60 (4.61–6.81) 26–35 years AOR: 4.05 (3.42–4.79) 36–45 years AOR: 4.49 (3.76–5.36) Early first intercourse was associated with reporting ≥2 new female sex partners in the past 6 months All ages AOR: 2.25 (1.96–2.58) 18–25 years AOR: 2.35 (1.91–2.88) 26–35 years AOR: 1.99 (1.53–2.60) 36–45 years AOR: 2.46 (1.86–3.26) Early first intercourse was associated with ever reporting sexual intercourse with a commercial sex worker for the entire sample and those aged 36–45 All ages AOR: 1.19 (1.06–1.34) 36–45 years AOR: 1.28 (1.08–1.53) No association was found in the younger age groups 18–25 years AOR: 1.31 (0.95–1.80) 26–35 years AOR: 1.12 (0.93–1.36)
Sexual partners						
Adimora et al. (2002)	United States National Survey of Family Growth (Cycle V, 1995)	Women, aged 22+, whose first intercourse occurred between 12–24 years and at least 5 years before the date of interview and not American Indian/Native American ($n = 7678$) % sexually active not given	Categorical: 12–14, 14–15, 16–17, 18–19, 20–24 years % not given for analyses subset	Logistic regression Adjusted for ethnicity, marital status, age and education	Concurrent sexual partners	Compared to those who had first sex at 20–24 years, linear increase in the odds ratio of concurrent partnership with decreasing age at first sex 12–14 years: OR 7.5 (4.8–11.7) 14–15 years: OR 3.3 (2.3–4.7) 16–17 years: OR 2.3 (1.6–3.2) 18–19 years: OR 1.4 (1.0–2.0) Continuous: 0.8 per year (0.77–0.84)
Adimora et al. (2007)	United States National Survey of Family Growth (Cycle VI, 2002–03)	Men, aged 22–44, with at least 1 year of sexual experience ($n = 3141$) 88 % of entire sample sexually active	Categorical: <12, 12–13, 14–15, 16–17, 18–19, 20+ years % not given for analysis subset	Logistic regression Adjusted for race/ethnicity, income, marital status, age at first sexual intercourse, alcohol or drug intoxication during sexual intercourse within the past year, incarceration within the past year, having a non-monogamous female partner and history of sexual intercourse with a man (initial model)	Concurrent sexual partnerships in the preceding year	Age at first sexual intercourse was not associated with concurrent sexual partnerships in the final logistic regression model

Table 2 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Adimora et al. (2011)	United States National Survey of Family Growth (Cycle VI, 2002–03)	Women, aged 22–44, with at least 1 year of sexual experience ($n = 5435$) 88 % of entire sample sexually active	Categorical: 12–13, 14–15, 16–17, 18+ years % not given for analysis subset	Logistic regression Adjusted for race/ethnicity, age, marital status, nonmonogamous male sexual partner in the past 12 months, drugs or alcohol during sexual intercourse in the past 12 months, binge drinking in the past 12 months, crack or cocaine use in the past 12 months	Concurrent sexual partnerships in the preceding year	Compared to those who reported first sexual intercourse 18 + years, those who had sex earlier were more likely to report concurrent sexual partnerships in the preceding year: 12–13 years: OR 2.89 (1.64–5.08) 14–15 years: OR 1.76 (1.08–2.87) 16–17 years: OR 1.24 (0.77–1.98)
Humblet et al. (2003)	Dunedin, New Zealand Dunedin Multidisciplinary Health and Development Study (1990–99)	Babies born in Dunedin, New Zealand between 1 April 1972 and 31 March 1973 at the Queen Mary Maternity Hospital. Completed at least one survey at ages 18, 21 26 ($n = 991$). % sexually active not given	Categorical: <16, 16–17, 18+ years % not given	Chi square test	Core group defined as ≥5 partners in the last year Core group defined as an annual average of ≥5 partners	Among women, age at first sex was not associated with reporting ≥5 partners in the past year, at ages 18, 21 and 26 Among men, a higher proportion of participants who reported early first sex reported ≥ 5 partners in the past year (age 21 $p < 0.001$, age 26 $p < 0.05$) For both men and women, higher proportions of participants who reported first sex before the age of 16 reported an annual average of ≥5 partners between sexual debut and age 21 (men $p < 0.001$, women $p < 0.05$). For men but not women (small cell sizes), the same association was reported between ages 21 and 26
Jensen et al. (2011)	Denmark, Iceland, Norway and Sweden (2004–05)	Women, aged 18–45, valid age at first sexual intercourse ($n = 59967$) 96.1 % sexually active	Categorical: ≤14, 15, 16, 17, 18+ years Sweden 13.0 % Denmark 12.2 %, Iceland 11.1 %, Norway 7.6 %, ≤14 years	Logistic regression Adjusted for country, age, education, marital status, condom use, STI, smoking, and alcohol consumption	Lifetime sexual partners	Younger age at first intercourse associated with being more likely to report high number (>10) of lifetime partners ≤14 years: OR 6.89 (6.37–7.45) 15 years: OR 3.76 (3.51–4.04) 16 years: OR 2.51 (2.34–2.69) 17 years: OR 1.86 (1.73–2.01) 18+ years: reference
Johnson et al. (1994)	Great Britain National Survey of Sexual Attitudes and Lifestyles (1990–91)	Men and women, aged 16–59 ($n = 18876$)	Categorical: <16, 16+ years 2.8–27.6 % men and 0.8–18.7 % of women <16 years	Logistic regression Adjusted for marital status, age group and social class	Heterosexual partners in the last year Lifetime heterosexual partners	Men and women who experienced sexual intercourse before the age of 16 were more likely to report two or more heterosexual partners in the last year Men: OR 2.7 Women: OR 3.6 Men and women who experienced sexual intercourse before the age of 16 were more likely to report 10 or more heterosexual partners ever (exact ORs not reported)

Table 2 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Kan et al. (2010)	United States National Longitudinal Study of Adolescent Health (waves 1–3, 1995–2002)	Men and women, aged 11–27, completed all three waves of the study, White, Black or Mexican–American and had a residential mother figure in the household at wave 1 ($n = 8707$)	Continuous	Multilevel modeling (three levels – age, individual, school) Adjusted for gender, family structure, maternal education, pubertal timing	Sexual relationships at each age	Later age at first sex was associated with fewer partners at age 17 but larger increases in number of partners (linear) among white, black and Mexican–American participants. Among white participants, those with later age at first sex also displayed less deceleration (quadratic) White: Age at first sex B −0.02 Age at first sex x linear B 0.02 Age at first sex x quadratic B 0.002 Black: Age at first sex: B −0.15 Age at first sex x linear: B 0.02 Mexican–American: Age at first sex: B −0.16 Age at first sex x linear: B 0.03
Santelli et al. (1998)	United States Youth Risk Behavior Survey (1992)	Men and women, aged 14–22, sexually experienced ($n = 5223$) 64 % men and 63 % women sexually active	Categorical: ≤13, 14–15, ≥16 years % not given	Logistic regression Recent partners adjusted for age, race/ethnicity, residence (men only), marital status, alcohol use score, and illicit drug use score Lifetime partners adjusted for age race/ethnicity, alcohol use and illicit drug use	Sexual partners in the past 3 months Lifetime sexual partners	For both men and women, earlier age at first intercourse was associated with reporting two or more sexual partners in the past 3 months ($n = 3737$ reported intercourse in the past 3 months) Men: ≤13 years: OR 3.52 (2.46–5.04) 14–15 years: OR 2.18 (1.56–3.03) ≥16 years: reference Women: ≤13 years: OR 1.98 (1.26–3.11) 14–15 years: OR 1.25 (0.85–1.83) ≥16 years: reference For both men and women. earlier age at first intercourse was associated with reporting six or more lifetime sexual partners ($n = 4722$) Men: ≤13 years: OR 12.54 (8.86–17.74) 14–15 years: OR 4.99 (3.66–6.79) ≥16 years: reference Women: ≤13 years: OR 6.81 (4.57–10.15) 14–15 years: OR 2.41 (1.81–3.20) ≥16 years: reference

Table 2 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Scott et al. (2011)	United States National Longitudinal Study of Adolescent Health (waves 1–4, 1995–2008)	Men and women, aged 20–27 at wave 3, 16 or older and not married at wave 2, with valid longitudinal weights at wave 3, sexually experienced by wave 3 and reported on at least one sex partner ($n = 5798$) 82.6 % sexually experienced at wave 3	Categorical: <16, 16+ years 26.2 % < 16 years	Multinomial and logistic regression Adjusted for inconsistent contraceptive use, ever had older partner, ever did not discuss contraception before first sex with a romantic partner, multiple partners by wave 2, ever had nonmonogamous partner, ever had nonromantic partners, ever had one-night stand, gender, age, race or ethnicity, ever-use of substance (tobacco, alcohol, drugs), high educational aspirations, cognitive ability, educational attainment, lived with two biological/adoptive parents, parents education and parent-teenager closeness.	Sexual partners in the last year	First sex before 16 was not associated with number of partners in the last year
Seidman et al. (1994)	United States National Survey of Family Growth (Cycle IV, 1988)	Women, aged 15–44, never married, divorced or separated, ever had intercourse ($n = 3378$) % sexually active not given	Categorical: <15, 15–17, 18–19, 19+ years % not given	Logistic regression Adjusted for age, central city residence, race, attendance of religious services, mother's age at first child, birth region and mother's employment and living arrangements	Two or more sexual partners in the past 3 months	Among never married women, younger age at first sexual intercourse was associated with reporting two or more sexual partners in the past 3 month. Significant among both White (≤17 years) and Black women(≤15 years) Among divorced/separately women, younger age at first sexual intercourse was associated with reporting two or more sexual partners in the past 3 months among Black women (≤15 years) but not White women. (Odds ratios were not reported)
Seidman et al. (1992)	United States National Survey of Family Growth (Cycle IV, 1988)	Women, aged 15–44, reported having sexual intercourse in the previous year ($n = 7011$) 83 % reported sex in the past year	Categorical: <15, 15–17, 18+ years % not given	Logistic regression, stratified by marital status and race Adjusted for age, education. residence in metropolitan area, religious affiliation and religiosity	Two or more sexual partners in the previous 3 months.	Among never-married women, early first sexual intercourse associated with reporting two or more sexual partners in the previous 3 months, among both White and Black women Never-married White women <15 years: OR 6.6 (2.4–18.8) 15–17 years: OR 3.6 (1.5–8.8) 18+ years: reference Never married Black women <15 years: OR 4.4 (2.0–10.1) 18+ years: reference Among divorced/separated women, age at first sexual intercourse was not associated with reporting two or more sexual partners in the previous 3 months

Table 2 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Stigum et al. (1997)	Norway (1987 & 1992)	Men and women, aged 18–52 Excluded if reported no sexual experience, ever same-sex experience, more than 15 partners per year (outliers) and those with missing data. ($n = 8477$) 92.4 % sexually active	Continuous	Poisson regression Adjusted for survey year, sex by age and cohabitation status, ten year increase in age, cohabitation status, population density, and HIV testing	Recent sexual partner frequency (calculated by number of "new" partners in the past 3 years, divided by three.)	For every one year increase in age at first intercourse, sexual partner frequency declined by a factor of 0.8 (0.8–0.9) (rate ratio)
Traeen and Stigum (1998)	Norway (1987 & 1992)	Men and women, aged 18–60, who were currently living with a partner ($n = 6522$) % sexually active not given	Continuous (<14 = 14, >21 = 21)	Logistic regression Adjusted for survey year, gender, year of birth, education, marital status, time married/ cohabitating, population density, number of traveling days, and partners before latest partnership	Parallel sexual partners (ever during present marriage/ cohabitation)	For every one unit increase in age at first intercourse, the odds of experiencing parallel sexual activity decreased by a factor of 0.8 (0.8–0.9)
Sexual practices and repertoire						
Belza et al. (2008)	Spain Health and Sexual Behavior Survey (2003)	Men, aged 18–49 ($n = 5153$) % sexually active not given	Categorical: <16, 16+ years 13.8 % <16 years	Logistic regression Adjusted for age, marital status, education, country of birth, size of municipality, religion, communication with parents about sex, goes out at night (last 12 months), having been drunk (last 30 days) and region	Paying for sex in the past 12 months	Men who reported first sexual intercourse before the age of 16 were more likely to have paid for sex in the past 12 months OR 1.9 (1.4–2.6)
Schei and Stigum (2010)	Norway Norwegian Sex Survey (1992, 1997 & 2002)	Men, aged 18–49 ($n = 4545$) % sexually active not given	Categorical: ≤16, 17–18, 19+ years 32 % ≤16 years	Logistic regression Adjusted for age, marital status, and socioeconomic status	Ever having paid for sex	Paying for sex association with early age at first intercourse ≤16 years: reference 17–18 years: OR 0.6 (0.5–0.8) 19+ years: OR 0.5 (0.3–0.6)
Relationships						
Lichter et al. (2010)	United States National Survey of Family Growth (1995 & 2002)	Women, aged 19–44 (1995 $n = 9456$, 2002 $n = 6612$) % sexually active not given	Categorical: <15, 15–17, 18+ years % not given	Multinomial logistic regression Adjusted for year, age, never-married, foreign born, race, biological parents married at birth, lived in intact family, mother figure graduated from high school and had birth before 18 years	Single-instance cohabitation and serial cohabitation (compared with no cohabitation)	Women who reported first sex before the age of 18 were more likely to report single-instance or serial cohabitation (compared with no cohabitation) Single-instance: <15 years: OR 2.56 15–17 years: OR 1.70 18+ years: reference Serial cohabitation: <15 years: OR 6.738 15–17 years: OR 2.836 18+ years: reference Also a significant difference between single and serial cohabitation

Table 2 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Teachman (2003)	United States National Survey of Family Growth (Cycle V, 1995)	Women, aged 15–44 years whose first marriage were contracted between 1970 & 1995 ($n = 6577$) % sexually active not given	Continuous	Cox Proportional hazards model Adjusted for wives characteristics—age at marriage, education, race, premarital birth, premarital conception, religion, number of siblings, father's education, mother's education, at least one parent died, parents divorced, other intact family, number of childhood living situations, husband's characteristics—age at marriage, education, married before, different race than wife, age difference between husband and wife, importance of religion, different religion than wife and premarital sex.	Risk of marital dissolution (separation or divorce)	For each year first sex was delayed, the risk of marital dissolution was reduced by 8 % HR = 0.919

of orgasm problems were found among early initiating men and women, as was a higher frequency of erectile problems among men (Sandfort et al., 2008). In the other study, sexual dysfunctions were not associated with early first sex in men or women (Else-Quest et al., 2005).

Three primary papers on sexual satisfaction suggest differences between men and women in the association. One study found no association between early first intercourse and sexual relationship satisfaction in either men or women (Sandfort et al., 2008). In the remaining two studies, early sexual debut was associated with increased reporting of physical pleasure, emotional satisfaction (Rissel et al., 2003) and higher levels of having a very satisfying sex life among men (Bozon, 1996). Among women, early first sex was not associated with levels of physical pleasure in sex (Rissel et al., 2003) or having a very satisfying sex life (Bozon, 1996) but was significantly correlated with moderate emotional satisfaction and a decrease in reports of being very emotionally satisfied (Rissel et al., 2003).

Relationship Formation and Dissolution Relationship outcomes have been investigated in three primary studies and two secondary studies. Early initiators have been found to report a greater interval between first sex and marriage yet were more likely to be married before the age of 20 (Miller & Heaton, 1991). A French study also reported longer intervals between first intercourse and first couple formation for early initiations, particularly among men. Patterns of couple formation, however, differed between men and women in this study. Upon forming their first couple, men who had sex earlier reported lower levels of marrying their partner within the first year compared with those who reported sex later. Overall half of the men who had sex early cohabited with their partner for at least a year before getting married. For women, however, those who have sex early tended to get married soon after forming a couple, this was less common among those who had sex at a later age (Bozon, 1996).

Earlier initiators have also been found to report high levels of living with a partner or living in a couple at least twice (Bozon, 1996; Lichter, Turner, & Sassler, 2010). Furthermore, the risk of marital dissolution has been found to reduce with increasing age at first sexual intercourse (Teachman, 2003), while the only study reporting on relationship quality (relationship solidity) found no difference according to age at first sexual intercourse (Sandfort et al., 2008).

Reproductive Outcomes

The association between early first sexual intercourse and pregnancies and pregnancy outcomes, STIs, and contraceptive use have all been investigated. Details of studies and findings can be found in Tables 3 (primary papers) and 4 (secondary reproductive outcome papers).

Table 3 Primary papers estimating the associations between early first sexual intercourse and reproductive outcomes

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Baumann et al. (2011)	Switzerland Swiss Multicenter Adolescent Survey on Health (SMASH-02, 2002)	Men and women, aged 16–20, in post-mandatory school (public high schools and vocational schools), ever engaged in vaginal intercourse ($n = 4388$) 60 % sexually active	Categorical: <16, ≥16 years 33.5 % <16 years	Logistic regression Adjusted for nationality, residency, academic track, parental education, relationship to parents, school context, pubertal timing and sexual abuse	Having been pregnant/having made partner pregnant Having used a condom at last sexual intercourse	Early sexual intercourse was associated with having been pregnant/having made partner pregnant when adjusted for age among men and women Men AOR (age) 4.28 (2.20–8.32) Women AOR (age) 2.89 (1.58–5.30) Association was no longer significant when adjusting for years since onset of sexual intercourse instead of age Men AOR (YSSI) 1.43 (0.58–3.53) Women AOR (YSSI) 1.01 (0.56–1.80) Among men, early sexual intercourse was associated with not having used a condom at last sexual intercourse when adjusting for age. The trend was reversed when adjusting for years since onset of sexual intercourse instead of age Men AOR (age) 1.71 (1.32–2.22) Men AOR (YSSI) 0.71 (0.50–1.00) Women who reported early sexual intercourse were more likely not to have used a condom at last sexual intercourse when adjusting for age. When adjusting for years since onset of sexual intercourse instead of age, the association was reversed with early initiators less likely not to use a condom Women AOR (age) 1.48 (1.14–1.91) Women AOR (YSSI) 0.59 (0.44–0.79)
de Sanjose et al. (2008)	Spain The AFRODITA study (2005)	Women, aged 18–70, sexually active ($n = 5789$) 92.2 % sexually active	Categorical: ≤17, 18+ years 2.5–36.5 % ≤17 years	Logistic regression Adjusted for age, residency, socio-economic level, screening cytology and all other variables tested	Ever use oral contraceptives Ever use condoms History of sexually transmitted disease Pregnancy	Early first sex associated with ever using oral contraceptives OR 1.79 (1.49–2.15) Not associated with ever use condoms Not associated with history of STDs Early first sex associated with ever being pregnant OR 2.96 (2.35–3.73)
Else-Quest et al. (2005)	United States National Health and Social Life Survey (1992)	Men and women, aged 18–59, who were sexually active and whose first intercourse was not coerced ($n = 2558$) % sexually active not given	Categorical (early, average, late): Men: ≤15, 16–18, 19+ years Women: ≤16, 17–19, 20+ years Early: 29.1 % of sexually experienced sample, 27.4 % of analysis sample	Multivariate analysis of covariance	Lifetime STDs (mean—gonorrhea, syphilis, herpes, chlamydia, genital warts, hepatitis and AIDS or HIV.)	Early sexual debut was associated with more STDs compared to those who reported average or late sexual debut Univariate: $F = 79.24$ Effect size (early and average): $d = 0.39$ Effect size (early and late): $d = 0.55$

Table 3 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Kaestle et al. (2005)	United States National Study of Adolescent Health (wave 3, 2001–02)	Men and women, aged 18–26, ever had sexual intercourse ($n = 9844$) 86.1 % sexually active	Continuous	Logistic regression Adjusted for sex, race, ethnicity, and parental education (prevalence odds ratios calculated for each current age group)	STI laboratory tested Chlamydia. gonorrhea and Trichomonas vaginalis	Early age at first sex associated with STIs up until the age of 23 No association between early first sex and STIs after the age of 23 (findings did not differ between men and women)
Magnusson et al. (2012)	United States National Survey of Family Growth (2006–08)	Women aged 15–44 years. Excluded women who were currently pregnant, or trying to conceive, reported they had never had sex, or did not have at least one partner in the year prior to the survey ($n = 3358$) % sexually active not given	Categorical: <15, 15–17, 18+ years 13 % <15 years	Logistic regression Adjusted for education, age, race/ethnicity, poverty level, insurance status, marital status, lived with 1 or 0 biological/adoptive parents, mother < 18 at first birth, mother's highest level of education, father's highest level of education, ever pregnant, intends future pregnancy, ever had an abortion, ≥2 partners in the last 12 months, and number of partners had sex	Inconsistent or non-user of contraception in the past year	Early first sexual intercourse was associated with reporting inconsistent use of contraception in the year prior to the interview <15 years AOR: 1.93 (1.23–3.00) 15–17 years AOR: 1.23 (0.89–1.70) 18+ years: reference Findings were only significant in older age groups when stratified by age group (<15 years vs. 18+ years) 18–24 years AOR: 0.76 (0.29–2.00) 25–34 years AOR: 2.01 (1.08–3.72) 35–44 years AOR: 4.51 (1.58–12.84)
Olesen et al. (2012)	Denmark, Iceland, Norway and Sweden (2004–05)	Women, aged 18–45 years, sexually active ($n = 64659$) Approximately 96.2 % sexually active	Categorical: ≤14, 15+ years 11.6 % ≤14 years	Logistic regression Adjusted for age as a continuous variable, country of residence and years of education	History of STIs (self-report genital Chlamydia, herpes, trichomoniasis, gonorrhea, and genital warts)	Young age at first sexual intercourse associated with reporting a history of STIs OR 2.03 (1.93–2.13)
Rissel et al. (2003)	Australia The Australian Study of Health and Relationships (2001–02)	Men and women, aged 16–59, ever had vaginal intercourse ($n = 18612$) 92.2 % men and 92.3 % women ever vaginal intercourse	Categorical: <16, 16+ years Men: 21.5 % <16 years Women: 13.4 % <16 years	Logistic regression	Ever diagnosed with STI (self-report)	Men and women who reported early first vaginal intercourse were more likely to have been diagnosed with an STI Men: OR 1.87 (1.63–2.14) Women: OR 2.22 (1.89–2.63)
Sandfort et al. (2008)	United States National Sexual Health Survey (1995–96)	Men and women, aged 18+ , who resided in the 48 contiguous states, sexually active ($n = 8466$) % sexually active not given	Categorical: early (fourth quartile), normative (second and third quartiles), late (first quartile) Roughly 25 % early	Logistic and linear regression Adjusted for race/ethnicity, educational level, place of residence when growing up, religiosity, migration status, age (as an indicator of potential cohort effects), history of non-consensual sexual experiences, first orgasm as solo or social experience, and any other sexual involvement before first sexual intercourse	STI history (self-report)	Men and women who reported early first intercourse were more likely to report a history of STIs Men: OR 2.21 Women: OR 1.64
Sneed (2009)	United States Youth Risk Behavior Survey (2007)	Men and women 9th–12thgrade. Only those aged16–18 who reported having sex at least once in their lifetime ($n = 5315$) % sexually active not given	Categorical: <13, 13+ years Men: 16 % <13 years Women: 6 % <13 years	Logistic regression, subgroup analysis by gender and ethnicity Adjusted for age	Used condom last sex	Condom use at last sex was not associated with early sexual debut for men or women

Table 4 Secondary papers estimating the associations between early first sexual intercourse and reproductive outcomes

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Multiple outcomes						
Wellings et al. (2001)	Great Britain Second National Survey of Sexual Attitudes and Lifestyles (1999–2000)	Men and women, aged 16–24, ever had sexual experience before the age of 18 ($n = 1420$) % reporting sexual experience in this sample not given	Categorical: <16, 16–18 years 25–30 % of all participants aged 16–24 years, <16 years	Logistic regression Adjusted for socioeconomic status of parents, communication with parents about sex, family structure, educational level, main source of information about sex, sexually competent at first intercourse and age at first menarche (women only)	Motherhood before the age of 18 years (women only) Abortion before the age of 18 years (women only) Ever had an STI (including candida for women) (self-report)	First intercourse before the age of 16 was associated with a higher prevalence of motherhood before the age of 18 <16 years: OR 2.78 (1.32–5.88) First intercourse before the age of 16 was associated with a higher prevalence of abortion before the age of 18. <16 years: OR 2.70 (1.23–5.92) Higher prevalence of STIs among men and women who reported first intercourse before the age of 16, not statistically significant
Pregnancy and outcomes						
Barrett et al. (1998)	United Kingdom National Sexual Attitudes and Lifestyle Survey (1990)	Women, aged 16–39, ever sexually active ($n = 5824$) 90.7 % sexually active	Categorical: 13–15, 16–17, 18–19, 20–24, 25+ 12 % 13–15 years.	Logistic regression Adjusted for age, ethnicity, religion, current marital status, number of 'live in' relationships, number of natural children, heterosexual partners(total), STD clinic attendance ever, injecting drug use ever, smoking, attitudes to one night stands and attitudes to abortion	Abortion	Younger age at first intercourse associated with increased odds of reporting ever having an abortion 13–15 years: OR 4.04 (2.90–5.18) 16–17 years: OR 2.91 (1.79–4.02) 18–19 years: OR 2.48 (1.37–3.59) 20–24 years: OR 2.08 (0.96–3.20) 25+ years: reference
Cavasoz-Rehg et al. (2010a)	United States Youth Risk Behavior Survey (YRBS) (1999–2003)	Men and women in 9th–12th grade (attending public, Catholic or other private schools) ($n = 14{,}211$) 43 % sexually active	Continuous	Multinomial logistic regression Adjusted for age, race/ethnicity, number of sexual partners, and survey year	Multiple pregnancies	Earlier age at first sex associated with increased risk of pregnancy 0 pregnancies: reference 1 pregnancy: OR 0.8 (0.7–0.9) 2+ pregnancies: OR 0.6 (0.5–0.7) 2+ (vs. 1) pregnancy: OR 0.8 (0.7–0.9)
Guzzo and Furstenberg Jr (2007)	United States National Study of Adolescent Health (wave 1 & 3) (1995 & 2001–2002)	Women aged 19–25 at wave 3, who had ever had sexual intercourse and who had had a nonmarital first birth and who did not give up their first born child for adoption. ($n = 1254$) % sexually active not given	Categorical: ≤15, 16+ years % not given	Multinomial logistic regression Adjusted for race, family structure, parental income, trouble in school score, years since last birth, wanted first birth, partner education, relationship continued after partner learned of pregnancy, cohabiting first birth and current relationship status	Likelihood women will have a subsequent birth with a new partner (by relationship status) Four categories: no birth (ref), birth with a new partner outside of a coresidential union, birth with a new cohabitating partner, birth with a marital new partner	Early first sex was not associated with having a birth with a new partner according to relationship status with new partner

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Jaffee et al. (2001)	Dunedin, New Zealand Dunedin Multidisciplinary Health and Development Study (1993–1994 and 1998–1999)	Babies born in Dunedin, New Zealand between 1 April 1972 and 31 March 1973 at the Queen Mary Maternity Hospital ($n = 1139$). Men, aged 26 ($n = 499$)	Categorical: <16, 16+ years 28 % <16 years	Cox regression analyses Adjusted for born to teen mother, either/both parents convicted of a crime, High SES, family conflict, number of caretaker changes, number of years living with a single parent, harsh discipline, inconsistent discipline, Poor parent–child relationship quality, history of conduct order, history of depression, leave school before age 16, and high reading scores	Likelihood of becoming a father (at any time between 14 and 26 years)	Early initiation of sexual activity increased the likelihood of becoming a father at any time between 14 and 26 years HR: 2.01
Manlove et al. (2009)	United States National Survey of Family Growth (2002)	Women aged 15–19 in 1992, 1997 or 2002, sexual experienced ($n = 1869$) 53 % sexually active	Continuous	Logistic regression Adjusted for cohort, age, race/ethnicity, country of origin, age at menarche, family structure at age 14, parents marital status at birth, mother's labor force status, mother's age at first birth, highest level of parent education, age difference with first partner, and relationship with partner at first sex	Teen birth	Older age at first sex was associated with being less likely to have a teen birth OR 0.78
Manlove et al. (2008)	United States National Survey of Family Growth (2002)	Men aged 16–45, only those who reported being fathers ($n = 1713$)	Continuous	Binary and multinomial logistic regression Adjusted for current age, race/ethnicity, parent's married at participants birth, family structure at age 14, number of siblings, mother worked full-time during participants childhood, parents completed some college or more, mother was a teen at first birth, age at first birth, marital/cohabitation status at first birth and number of children with first mother	Having births to multiple partners Having births to multiple partners by type of multiple partner fertility (marital, non-marital)	Men who were older at first sex were less likely to report multiple partner fertility OR 0.88 Older age at first sex reduced the odds of experiencing non-marital only multiple partner fertility and multiple partner fertility with at least one marital birth (compared to single-partner fertility) Non-marital only: OR 0.89 At least one marital birth: OR 0.88 Age at first sex did not differentiate marital and non-marital multiple partner fertility

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Manlove et al. (2000)	United States National Survey of Family Growth (1995)	Women aged 12–19 between 1980–1986 (cohort 1, $n=4883$), 1987–1991 (cohort 2, $n=3672$) and 1992–1995 (cohort 3, $n=2168$). (Can be in more than one cohort.) Roughly 50 % sexually active	Categorical (had sex): <15, 15+ years Continuous Roughly 25–30 % of entire sample	Proportional hazards modeling Model 3 included those aged 16 and over at the end of each birth cohort (irrespective of sexual experience). Used the categorical definition of age at first sex and adjusted for being the daughter of a teenage mother, the number of children in the family, family type/changes in living situation, mother's education, race and ethnicity, high school dropout status, discussions with parents, receipt of sex education and age at first menarche Model 4—included only sexually experienced participants. Used continuous definition of age at first sex. Adjusted for same variables as model 3 plus contraceptive use at first sex	First teenage birth	Model 3—Reporting sex before the age of 15 was associated with increased risk of teenage birth in each cohort Cohort 1: OR 2.46 Cohort 2: OR 3.00 Cohort 3: OR 2.59 Model 4—Older age at first sex associated with a reduced risk of teenage birth Cohort 1: OR 0.88 Cohort 2: OR 0.82 Cohort 3: OR 0.85
Regushevskaya et al. (2009)	Finland 1992 & 1999	Women aged 18–44, ever had sexual intercourse ($n=1070$) % sexually active not given	Ca (ref)tegorical: <18, 18+ years 69 % women 18–24 years, 60 % women 25–34 years and 51 % women 35–44 years (<18 years)	Logistic regression Adjusted for age and education	Abortion	Women who had first sex before the age of 18 were more likely to report an abortion OR 1.79 (1.12–2.64)
Scott et al. (2011)	United States National Longitudinal Study of Adolescent Health (waves 1–4) (1995, 1996, 2002 & 2008)	Men and women aged 20–27 at wave 3, 16 or older and not married at wave 2, with valid longitudinal weights at wave 3, sexually experienced by wave 3 and reported on at least one sex partner ($n=5798$) 82.6 % sexually experienced at wave 3.	Categorical: <16, 16+ years 26.2 % <16 years	Multinomial and logistic regression Adjusted for inconsistent contraceptive use, ever had older partner, ever did not discuss contraception before first sex with a romantic partner, multiple partners by wave 2, ever had nonmonogamous partner, ever had nonromantic partners, ever had one-night stand, gender, age, race or ethnicity, ever-use of substance (tobacco, alcohol, drugs), high educational aspirations, cognitive ability, educational attainment, lived with two biological/adoptive parents, parents education and parent-teenager closeness	STD diagnosis in the last year (biomarker test—chlamydia, gonorrhea, trichomoniasis or self-report—syphilis, genital herpes, genital warts, human papillomavirus, bacterial vaginosis, pelvic inflammatory disease, cervicitis, urethritus, HIV or AIDS) Intended, unintended or no birth at age 20–24	First sex before 16 was not associated with STD diagnosis in the last year Compared to participants who reported no births, participants who reported sex before the age of 16 had a reduced risk of intended births but no difference in unintended births. Intended versus none: RR 0.6

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Stone and Ingham (2011)	Great Britain Second National Survey of Sexual Attitudes and Lifestyles (2000–01)	Women, aged 16–44, ever engaged in sexual intercourse ($n = 5625$), repeat abortion restricted to women who reported ever having an induced abortion ($n = 1003$) % sexually active not given	Continuous and categorical Categorical: 13–15, 16–17, 18–19, 20–24, 25+ years 21.7 % 13–15 years	Chi square and logistic regression	Ever having an abortion Having more than one abortion	Age at first sexual intercourse (categorical) was bivariately associated with ever having an abortion, with women under the age of 16 reporting the highest percentage of abortion ($p < 0.001$) Age at first sexual intercourse (categorical or continuous) was not included in the final "best fit" model predicting repeat abortions among women who have had a prior abortion
van Roode et al. (2012)	Dunedin, New Zealand Dunedin Multidisciplinary Health and Development Study (1993–1994, 1998–1999 & 2003–05)	Babies born in Dunedin, New Zealand between 1 April 1972 and 31 March 1973 at the Queen Mary Maternity Hospital ($n = 1139$). 506 men and 479 women who participated in at least one assessment (ages 21, 26 or 32 years) % sexually active not given	Categorical: ≤14, 15–17, 18+ years 18 % of men and 15 % of women ≤14 years	Poisson regression	Likelihood of first birth prior to ages 21, at ages 21–25 and at ages 26–31	Age at first intercourse was inversely associated with the likelihood of first birth within each age period. At each age group, those who had older first sex were less likely to report a first birth Men <21 years ≤14 years: OR 3.1 (1.6–6.0) 15–17 years: reference 18+ years: 0.3 (0.1–1.0) Men 21–25 years ≤14 years: OR 1.4 (0.7–2.5) 15–17 years: reference 18+ years: OR 0.6 (0.3–1.1) Men 26–31 years ≤14 years: OR 0.5 (0.3–1.1) 15–17 years: reference 18+ years: OR 0.6 (0.4–1.0) Women <21 years ≤14 years: OR 2.0 (1.2–3.4) 15–17 years: reference 18+ years: OR 0.1 (0.0–0.4) Women 21–25 years ≤14 years: OR 1.3 (0.8–2.3) 15–17 years: reference 18+ years: OR 0.4 (0.2–0.8) Women 26–31 years ≤14 years: OR 1.4 (1.0–2.0) 15–17 years: reference 18+ years: OR 0.7 (0.5–1.0)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Wellings et al. (1999)	Great Britain National Survey of Sexual Attitudes and Lifestyles (1990–91)	Women aged 20–59, reported sexual experience before the age of 20 ($n = 9470$) % sexually active not given	Categorical: <16, 16–19 years % not given	Logistic regression Adjusted for current age, education level, family structure, discussion about sex, parental strictness, family disruption, and discipline	Teenage motherhood (first child born before the age of 20)	Teenage motherhood was approximately three time more likely to occur among women who reported first intercourse before the age of 16, compared to women who reported first intercourse at 16 or older (exact odds ratios not given)
Woodward et al. (2006)	Christchurch, New Zealand Christchurch Health and Development Study (2002)	Children born in Christchurch over a 4-month period in 1977 522 men and 533 women where information was available on parenthood up to age 25 % sexually active not given	Categorical: <16, 16+ years 24 % men and 26 % women <16 years	Proportional hazards regression Adjusted for gender, socioeconomic status, Maori ethnicity, age of participant's mother at first childbirth, change of parents, parental use of physical punishment, childhood conduct problems, and grade point average	Parenthood by age 25	Early first intercourse was positively associated with parenthood by the age of 25 B(SE) 0.830(0.152), $p < 0.001$
Zavodny (2001)	United States National Survey of Family Growth (1995)	Women aged 20–28, who were not married and were between 15–19 years when they first had voluntary sex ($n = 1514$) % sexually active not given	Continuous	Binary and multinomial logistic regression. Woman characteristics only adjusted for race/ethnicity, religion, frequency of religious attendance, mother worked, mother's education and intact two-parent family Joint characteristics adjusted for race/ethnicity, religion, frequency of religious attendance, mother worked, mother's education, intact two-parent family, partner's age, partner's religion, partner's education at first intercourse, and differences in age, race/ethnicity and education between partners	Non-marital pregnancy among teenage women in their first voluntary sexual relationship Whether non-marital teenage pregnancy ends in abortion or non-marital birth (compared to marital birth)	The likelihood of pregnancy decreased with an increase in the women's age at first sex. Significant association adjusting for women's characteristics and joint characteristics (women and partner) Adjusted for women's characteristics: OR 0.82 Adjusted for joint characteristics: OR 0.76 Age at first sex was not associated with pregnancy resolution (non-marital birth or abortion, multinomial logistic regression)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Sexually Transmitted Infections						
Eberhart-Phillips et al. (2001)	Dunedin, New Zealand Dunedin Multidisciplinary Health and Development Study (1993–1994 and 1998–1999)	Babies born in Dunedin, New Zealand between 1 April 1972 and 31 March 1973 at the Queen Mary Maternity Hospital ($n = 1139$). 869 respondent who provided a serum specimen at age 26 % sexually active not given	Categorical: ≤13, 14–16, 16+ years 6.7 % men and 6.1 % women ≤13 years	Logistic regression	HSV-2 seroprevalence at age 26 HSV-2 incidence between ages 21 and 26	Earlier age at first intercourse was associated with seropostivity for HSV-2 among both men and women Men: ≤13 years: PR 4.7 (1.9–11.8) 14–16 years: PR 2.2 (1.0–4.6) 16+ years: reference Women: ≤13 years: PR 2.7 (1.4–5.5) 14–16 years: PR 1.5 (0.9–2.4) 16+ years: reference After adjusting for number of lifetime partners the association was no longer significant among women Earlier age at first intercourse was associated with HSV-2 incidence between ages 21 and 26 Men: ≤13 years: RR 5.6 (1.4–22.1) 14–16 years: RR 3.0 (1.1–9.2) 16+ years: reference Women: ≤13 years: RR 4.1 (1.7–9.7) 14–16 years: RR 1.8 (0.9–3.5) 16+ years: reference
Eberhart-Phillips et al. (1998)	Dunedin, New Zealand Dunedin Multidisciplinary Health and Development Study (1993–1994)	Babies born in Dunedin, New Zealand between 1 April 1972 and 31 March 1973 at the Queen Mary Maternity Hospital ($n = 1139$). 690 participants who provided a serum specimen, sexual history at age 21 and reported sexual experience. 89 % sexually active	Categorical: ≤16, >16 years 53.3 % ≤16 years	Prevalence ratios	HSV-2 Seroprevalence at age 21	Early age at first sexual intercourse was not associated with HSV-2 seropositivity for men or women

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Faber et al. (2011)	Denmark, Iceland, Norway and Sweden (2004–05)	Women aged 18–45 ($n = 69{,}475$) % sample sexually active not given	Categorical: ≤14, 15–16, 17–18, 19+ years % not given	Logistic regression Adjusted for age, country, education, lifetime number of partners and a history of other STIs	Self-reported: Genital chlamydia Genital herpes Trichomonas vaginalis Gonorrhea	Younger age at first sex associated with genital Chlamydia: ≤14 years: OR 1.59 99 %CI (1.39–1.81) 15–16 years: OR 1.47 99 % CI (1.32–1.65) 17–18 years: OR 1.31 99 % CI (1.17–1.47) 19+ years: reference Not associated with genital herpes or Trichomonas vaginalis Younger age at first sex associated with gonorrhea: ≤14 years: OR 3.19 99 %CI (2.11–4.83) 15–16 years: OR 2.27 99 % CI (1.55–3.35) 17–18 years: OR 1.63 99 % CI (1.09–2.44) 19+ years: reference
Johnson et al. (2012)	Great Britain Second National Survey of Sexual Attitudes and Lifestyles (1999–2000)	Men and women aged 16–44 years, reported sexual intercourse with at least one person and provided a urine sample ($n = 3123$) % sexually active not given	Categorical: <16, 16–17, 18+ years % not given	Logistic regression Men's findings adjusted for number of sexual partners without a condom, last year and number of new sexual partners, last year	High risk HPV (types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68)	Age at first heterosexual sex was not associated with High risk HPV among women in stepwise logistic regression Age at first heterosexual sex was positively associated with High risk HPV among men in a stepwise logistic regression <16 years: 2.06 (1.19, 3.56) 16–17 years: 1.23 (0.70–2.14) 18+ years: reference
Khan et al. (2005)	Australia Australian Longitudinal Study of Women's Health (survey 2) (2000)	Women aged 22–27, answered STI questions ($n = 9683$) % sexually active not given	Categorical: <15, 16–17, 18+ years % not given	Logistic regression Genital warts adjusted for number of male sexual partners, number of years taken oral pills. use of condom for infection prevention, ever used drugs for non-medical purposes, stress score and age	Self-reported chlamydia infection in the past 4 years Self-reported genital herpes in the past 4 years Self-reported genital warts in the past 4 years	Early first intercourse was not associated with chlamydia or genital herpes in the multivariate analysis Later age at first intercourse was associated with genital warts in the previous 4 years <15 years: reference 16–17 years: OR 1.27 (0.93–1.75) 18+ years: OR 1.60 (1.16–2.20)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Kjær et al. (2007)	Denmark, Iceland, Norway and Sweden (2004–05)	Women aged 18–45, answered genital warts questions ($n = 69147$) % sexually active not given (data was not censored)	Categorical: ≤14, 15–16, 17–19, 20+ years or never 11.4 % ≤14 year	Logistic regression Adjusted for age Adjusted for country, age, pregnancy history, hormonal contraception, condom use, lifetime number of sex partners, STD, education, smoking, and alcohol use	Self-reported clinically diagnosed genital warts	After adjusting for age, age at first intercourse was associated with self-reported clinically diagnosed genital warts ≤14 years: OR 4.50 15–16 years: OR 3.17 17–19 years: OR 2.22 20+ years or never: reference Age at first intercourse was not associated with self-reported clinically diagnosed genital warts when adjusting for all variables.
Kramer et al. (2010)	The Netherlands PIENTER 2 project (2006–07)	Women aged 15–26 ($n = 637$) 74 % sexually active (data was not censored)	Categorical: no sexual contact, <16, 16+ years, missing 14 % <16 years	Logistic regression Adjusted for region, municipality, age, and sexually transmitted infection diagnosis ever	Seroprevalence HPV6, −11, −16 and/or −18	Age at first sex was not associated with HPV seroprevalence in multivariate analysis
Manhart et al. (2006)	United States National Longitudinal Study of Adolescent Health (Wave 3) (2000–01)	Women aged 18 to 25, sexually active and were flagged for recruitment for HPV testing ($n = 3262$) 59 % of women who provided urine samples for HPV testing were sexually active	Categorical: ≤16, 17+ years % not given	Poisson regression Adjusted for age, having undergone a colposcopy in the past year, most recent partner is African American, engaged in an unwanted sexual situation after drinking, > 3 lifetime sex partners, single (never married), illegal drug use in the past 12 months, currently involved with more recent partner, and received oral sex from most recent partner	Human papillomavirus infection	Age at first vaginal sex was not associated with HPV infection
Miller et al. (1999)	United States National Survey of Family Growth (1995)	Women aged 15–44, sexually active. ($n = 9882$) % sexually active not given	Categorical: <15, 15–16, 17–18, 19+ years (descriptive) Continuous (analyses) 13.5 % <15 years	Logistic regression Bacterial STDs adjusted for race, age, education, and lifetime sexual partners. PID adjusted for race, age, education, lifetime sexual partners, IUD use, douching and bacterial STD	Bacterial STDs (self-report of gonorrhea and Chlamydia)	Odds of bacterial STDs decreased with increasing age at first intercourse <15 years: 13.0 % 15–16 years: 7.0 % 17–18 years: 5.3 % 19+ years: 3.4 % OR 0.94 (entered as a continuous variable)
Regushevskaya et al. (2010)	Finland 1992 & 1999	Women aged 18–44, ever had sexual intercourse ($n = 1070$) % sexually active not given	Categorical: <18, 18+ years 69 % women 18–24 years, 60 % women 25–34 years and 51 % women 35–44 years (<18 years)	Logistic regression Adjusted for age.	Self-reported "typical STIs" (syphilis, gonorrhea or chlamydia infection)	Women who had first intercourse before the age of 18 were more likely to report STIs OR 2.27 (1.41–3.65)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Upchurch et al. (2004)	United States National Longitudinal Study of Adolescent Health (waves 1 & 2) (1995 & 1996)	Men and women, 7th–12th grade. Sexually experienced by wave 1, individuals reporting first sex before 11 years were excluded ($n = 3396$) 38.3 % sexually active (wave 1)	Categorical: 11–13, 14–16, 17+, missing (known sexual experience but unknown age at first intercourse 23.6 % 11–13 years	Logistic regression Adjusted for age, gender, race/ethnicity, nativity status, family structure, parental education, father's occupation status, mother's presence in the morning, father's presence in the morning, neighborhood and school.	Ever having any STD as of the wave 1 interview (chlamydia, syphilis, gonorrhea, HIV/AIDS, genital herpes, genital warts, trichomoniasis, hepititas B, bacterial vaginitis (women only) and non-gonococcal vaginosis (women only) Any STD between waves 1 & 2	Compared with those who reported first intercourse before the age of 13, those who reported first intercourse at older ages were less likely to have ever had an STI ≤13 years: reference 14–16 years: coefficient −0.53 ≥17 years: coefficient −1.00 missing: not significant Compared to those who reported first intercourse before the age of 13, those who reported first intercourse between 14 and 16 years were less likely to report an STD between waves 1 & 2 ≤13 years: reference 14–16 years: coefficient −0.39 ≥17 years: not significant missing: not significant After adjusting for having an STD by wave 1, association between age at first sex and any STD between waves 1 & 2 was no longer significant
Contraceptive use						
Bender and Kosunen (2005)	Iceland (1996)	Men ($n = 224$) and women ($n = 1{,}181$) aged 17–20, sexually active 82 % sexually active	Categorical: ≤ 14, 15–16, 17+ years 28.5 % women and 29.2 % men ≤14 years	Logistic regression Adjusted for relationship status, contraception service evaluation and beliefs regarding pregnancy and contraception	General contraceptive use	No association between age at first sex and general contraceptive use among men Older age at sexual debut was associated with being more likely to use contraception among women ≤14 years: reference 15–16 years: OR 2.33 (1.57–3.47) 17+ years: OR 5.42 (3.01–9.78)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Cavasoz-Rehg et al. (2010b) Contraception	United States Youth Risk Behavior Surveillance System (YRBSS) (1999–2007)	Men and women in 9th–12th grade (attending public, Catholic or other private schools) ($n = 24{,}638$) 52.4 % sexually active	Categorical: ≤12, 13–14, 15–16, 17+ years 18.6 % men and 8.7 % of women ≤12 years	Multinomial logistic regression Adjusted for risk scale (substance use behaviors), number of sex partners, and race	Type of contraception used at last sexual intercourse (no method, withdrawal only, DMPA only, dual method, condom only)	All compared to condom only use and 17+ years: No method Men: ≤12 years: OR 2.2 (1.5–3.4) 13–14 years: OR 1.2 (0.9–1.7) 15–16 years: OR 1.1 (0.8–1.4) Women: ≤12 years: OR 4.5 (3.2–6.4) 13–14 years: OR 2.3 (1.6–3.1) 15–16 years: OR 1.5 (1.2–1.9) Withdrawal only no association Birth control pills only Men: ≤12 years: OR 1.3 (0.8–2.3) 13–14 years: OR 1.9 (1.2–2.9) 15–16 years: OR 1.4 (1.0–2.0) Women: no association DMPA (injectable birth control) only Men: no association Women: ≤12 years: OR 2.5 (0.9–7.5) 13–14 years: OR 3.4 (1.3–8.7) 15–16 years: OR 2.3 (0.9–5.8) Dual methods Men: ≤12 years OR 0.6 (0.4–1.0) 13–14 years: OR 0.7 (0.4–1.1) 15–16 years: OR 0.9 (0.6–1.2) Women: ≤12 years: OR 1.3 (0.8–2.0) 13–14 years: OR 1.7 (1.2–2.5) 15–16 years: OR 1.2 (0.9–1.6)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Kraft and Rise (1991)	Norway (1988–89)	Men and women aged 17–19 ($n = 1172$) 64.2 % sexually active	Categorical: ≤13, 14, 15, 16, 17, 18–19 years Men: 5.6 % ≤13 years, women 6.6 % ≤13 years	Logistic regression For women. condom use at most recent intercourse was adjusted for age, educational aspirations, use of condom at first intercourse and length of relationship	Non-use of contraception at most recent intercourse Condom use at most recent intercourse	No association with non-use of contraception at most recent intercourse for either men or women No association with condom use at most recent intercourse for men Girls who reported first sex at 17 years were more likely to use a condom at most recent intercourse compared to girls who reported first intercourse at 13 years OR 4.34 (1.28–14.75)
Leval et al. (2011)	Sweden Attitudes toward HPV vaccination survey (2007)	Men and women aged 18–30 (only included those who reported sex with a temporary partner in the past year, $n = 2594$) % sexually active (entire sample) not given	Categorical: <15, 15–18, 19+ years % not given for analysis sample	Multinomial logistic regression Condom use with temporary partners for women was adjusted for relationship status, education level, salary, social welfare in family, country of mother's birth, number of temporary sex partners in the past year, STI risk perception, anal sex ever, and sexual contacts	Condom use with temporary partners	For women, first intercourse before the age of 15 was associated with being more likely to seldom/never use condoms with temporary partners compared to women who reported first sex between the ages of 15 and 18 years, OR 1.95 (1.46–2.60) No association between condom use with temporary partners and early first intercourse for men
Manlove et al. (2007)	United States National Survey of Family Growth (1995)	Women aged 15–24, who reported their first voluntary sexual intercourse between January 1991 and the interview and did not marry their first partner. ($n = 915$) % sexually active not given	Continuous	Logistic regression Adjusted for partner characteristics, relationship characteristics, family and individual controls, race/ethnicity, grades, church attendance at age 14, discussion with parents on how pregnancy occurs and received 3 + forms of sex education before first sex.	Ever used contraception in first sexual relationship Uninterrupted use of contraception in first sexual relationship	Older age at first sex was associated with an increase in ever using contraception in first sexual relationship OR 1.26 When interactions were included in model, age at first sex was significant for whites (OR 1.46) but not for Hispanics (OR 1.06) Age at first sex not associated with uninterrupted use of contraception in first sexual intercourse
Ottesen et al. (2002)	Switzerland (1996)	Men and women, aged 16–20, sexually active, attending high school or apprenticeship ($n = 2131$) 50 % sexually active	Categorical: <14, >14 years % not given	Logistic regression Adjusted for living in urban areas, having regular sexual intercourse, more than three partners, not using the pill at first sexual intercourse, contraception not to prevent AIDS, ever had a pregnancy test and think to ask for HIV test	Emergency contraception use	Age at first sexual intercourse was not associated with emergency contraceptive use in multivariate model. (Significant in univariate analysis)

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Rotermann and McKay (2009)	Canada Canadian Community Health Surveys (CCHS) (2003 & 2005)	Men and women aged 20–34, unmarried, not living common-law (single, never married, widowed, separatey or divorced) and reported sexual intercourse in the 12 months before the interview. ($n = 19455$) 85.4 % of UMNLC sexually experienced of these 88.9 % reported sexual intercourse in the 12 months before the interview	Categorical: ≤13, 14+ years % not given	Logistic regression Adjusted for age, place of residence, education, adjusted household income, self-identified sexual identity, off-reserve Aboriginal person and number of partners	Condom use at last sexual intercourse	Men and women who reported first sexual intercourse before the age of 13 were less likely to use a condom at last intercourse compared to those who reported first intercourse at 14 years or older Men: OR 0.6 (0.5–0.8) Women: OR 0.6 (0.4–0.8)
Ruiz-Munoz et al. (2011)	Spain (2006)	Women aged 15–49 years, only included women who reported sex in the previous 4 weeks in analyses ($n = 3500$) % sexually active not given	Categorical: <16, 16–17, 18–19, >19 years 7.9 % <16 years	Logistic regression Adjusted for age, education, country of origin, religious, living with partner, children, contraecption use at first intercourse	Use of contraception during the previous 4 weeks	Women who reported first intercourse after the age of 19 years were less likely to use contraception in the past 4 weeks <16 years: OR 1.16 (0.71–1.89) 16–17 years: OR 0.76 (0.57–1.03) 18–19 years: reference >19 years: OR 0.77 (0.60–0.99) Stratified by use of contraception at first intercourse: Among women who used contraception at first intercourse, those aged 16–17 and older than 19 years were less likely to use contraception in the past 4 weeks compared to women aged 18–19 years at first intercourse <16 years: OR 0.79 (0.38–1.67) 16–17 years: OR 0.59 (0.40–0.87) 18–19 years: reference >19 years: OR 0.70 (0.50–0.98) Among women who did not use contraception at first intercourse, age at first intercourse was not associated with contraception use in the previous 4 weeks

Table 4 continued

Reference	Study details	Sample characteristics	First sexual intercourse definition	Analysis	Outcome variables	Findings
Santelli et al. (1997)	United States Youth Risk Behavior Survey (1992)	Men and women, aged 14–22, never married and reported ever having sexual intercourse ($n = 4260$) 60 % of never married participants reported ever having intercourse	Categorical: ≤13, 14–15, 16+ years % not given	Logistic regression Adjusted	Pill and condom use at last intercourse Condom only use at last intercourse	Younger age at first intercourse associated with lower use of condom use with the pill at last intercourse among women (adjusted for age, race/ethnicity, number of partners in the past 3 months and discussed HIV with adult relatives) ≤13 years: OR 0.39 (0.16–0.94) 14–15 years: OR 0.56 (0.33–0.98) ≥16 years: reference No association between age at first sex and condom use with the pill at last intercourse for men Younger age at first intercourse associated with lower use of condoms only at last intercourse among men (adjusted for age, race/ethnicity, risk behavior score, number of partners in the past 3 months and discussed HIV with adult relative) and women (adjusted for age, race/ethnicity, risk behavior score and seat belt use) Men: ≤13 years: OR 0.34 (0.20–0.55) 14–15 years: OR 0.48 (0.32–0.73) ≥16 years: reference Women: ≤13 years: OR 0.27 (0.17–0.45) 14–15 years: OR 0.65 (0.44–0.94) ≥16 years: reference
Stigum et al. (1995)	Norway (1987 & 1992)	Women, aged 18–35, with non-cohabitating partners, sexually experienced and no same-sex partners in the past 3 years ($n = 1075$) 80.6 % of women who were not married or cohabitating.	Categorical: ≤17, 18+ years 68 % ≤17 years	Logistic regression Adjusted for cohabitation status, education, lifetime partners, frequency of intercourse, HIV test, partner HIV test, and survey*partner origin	Condom use at latest intercourse with non-cohabitating partner	Older age at sexual debut associated with increased condom use at latest intercourse with non-cohabitating partner. 18+ years: OR 1.5 (1.0–2.2)

Pregnancy and Pregnancy Outcomes

A total of two primary and fifteen secondary studies have investigated the relationship between early first sexual intercourse and pregnancy outcomes. Early first sexual intercourse was associated with higher prevalences of teen pregnancy among young women (Wellings et al., 2001) and adult women (Wellings, Wadsworth, Johnson, Field, & Macdowall, 1999) in Great Britain, young women the United States (Cavazos-Rehg et al., 2010a, b; Manlove et al., 2009; Manlove, Terry, Gitelson, Papillo, & Russell, 2000), and young men (partner pregnant) and women in Switzerland (Baumann et al., 2011). In the Swiss study, however, the relationship became non-significant when adjusted for years since the onset of sexual activity instead of age. Younger age at first sexual intercourse was also found to increase the odds of ever being pregnant among Spanish women (de Sanjose et al., 2008).

Studies in New Zealand have reported sex before the age of 16 to be associated with becoming a biological parent by the age of 25 (Woodward, Fergusson, & Horwood, 2006) and increased likelihood of becoming a father between the ages of 14 and 26 years (Jaffee, Caspi, Moffitt, Taylor, & Dickson, 2001). Another study investigated the association between age at first sexual intercourse and different ages at first birth (<21, 21–25, and 26–31 years). In general, those who had sex early were more likely to have a first birth in each age period, although this was only significant for first births before the age of 21. Those who had first sex later were in general, less likely to have had a first birth during each of the age periods (van Roode, Dickson, Sharples, & Paul, 2012).

Research from the United States reported early age at first intercourse not to be associated with the resolution of non-marital teen pregnancies (marital birth, non-marital birth or abortion) (Zavodny, 2001), nor the risk of having an unintended birth between the ages of 20–24, although early initiators were less likely to have an intended birth between these ages (Scott et al., 2011). Finally, research has found early first sexual intercourse was associated with reporting multiple partner fertility among male fathers (Manlove, Logan, Ikramullah, & Holcombe, 2008) but not associated with having a birth with a new partner among women with a non-marital first birth (aged 19–25), according to relationship status with their new partner (Guzzo & Furstenberg, 2007).

Higher prevalences of abortion have also been reported among early initiators. Increased reporting of teen abortions and ever having an abortion have been reported among young British women (Wellings et al., 2001), and British (Barrett, Peacock, & Victor, 1998) and Finnish women (Regushevskaya et al., 2009) respectively, who experienced early first sexual intercourse. Among women who have ever had an abortion in Britain, however, age at first sexual intercourse was not associated with whether these women reported a subsequent abortion or not (Stone & Ingham, 2011).

Sexually Transmitted Infections

Six primary studies and 13 secondary studies have reported on the association between early first sexual intercourse and STIs. Overall, there appears to be little difference in the patterns of association for men and women, yet substantially less data are available for men. The most inconsistent findings have been reported among studies investigating self-reported general history of STIs (i.e., any STI). Overall, five of these studies reported early sexual intercourse to be associated with increased reporting of STIs (Else-Quest et al., 2005; Olesen et al., 2012; Rissel et al., 2003; Sandfort et al., 2008; Upchurch, Mason, Kusunoki, & Kriechbaum, 2004) and the remaining three studies found no association (de Sanjose et al., 2008; Scott et al., 2011; Wellings et al., 2001).

Studies investigating specific types of STIs, however, provide some evidence that the association with early sexual intercourse may vary between bacterial (Chlamydia, gonorrhea, syphilis), viral (genital herpes, human papilomavirus, HIV, hepatitis B) and, parasitic (trichomoniasis, vaginitis, pubic lice) STIs. Although there are insufficient data to do more than speculate as the relationship has not been explicitly tested, it appears early sexual intercourse is associated with ever having a bacterial STI (Faber et al., 2011; Miller, Cain, Rogers, Gribble, & Turner, 1999; Regushevskaya et al., 2010), particularly, in adolescence and early adulthood (Kaestle et al., 2005) (note, two previous studies reported no association between early sex and current bacterial STI (Kaestle et al., 2005) or recent bacterial STIs (Khan, Hussain, & Schofield, 2005) among participants in their mid-to-late twenties).

Research on viral STIs, however, suggests early first sex maybe a less important predictor, particularly in adolescence. Early first sex was not associated with self-reported genital herpes in two studies (Faber et al., 2011; Khan et al., 2005), a New Zealand study also reported no association with herpes simplex virus type 2 (HSV-2) seroprevalence at age 21 (Eberhart-Phillips et al., 1998), although early first sex was found to be associated with HSV-2 incidence between the ages of 21 and 26 (Eberhart-Phillips et al., 2001). Studies of human papillomavirus (HPV) and one of its outcomes, genital warts have also been mixed. Two studies of women reported no association between age at first sex and HPV seroprevalence (Kramer et al., 2010) and HPV detected in urine (Manhart et al., 2006). A further study reported age at first sex to be associated with high risk HPV in men but not women (Johnson et al., 2012), while another reported a significant association between early first intercourse and self-reported history of genital warts, that became non-significant when adjusted for other sexual behaviors and demographics (Kjær et al., 2007). The final study reported increased self-report of genital warts among those who had later first sex (Khan et al., 2005). Finally, the only study to report specifically on trichomonas vaginalis found no association (Faber et al., 2011).

Contraceptive Use

Four primary papers and 10 secondary papers have looked at early first intercourse and later contraceptive use. In general, findings have been mixed.

A study of US women reported early first sex to be associated with inconsistent use of contraception in the past years. When stratified by age group, however, the association was found to be significant among participants aged 25–44 but not among younger participants (18–24 years) (Magnusson, Masho, & Lapane, 2012).

Lower levels of condom use at last intercourse were associated with earlier first sexual intercourse among young women in Norway (Kraft & Rise, 1991), and 18–35 year old Norwegian women with non-cohabiting partners (Stigum, Magnus, Veierod, & Bakketeig, 1995). Similar findings were also reported among young men and women in the US (lower levels of condom use with the pill were also reported among women) (Santelli et al., 1997), men and women in Canada (not married, living in common law) (Rotermann & McKay, 2009) and young men and women in Switzerland (when adjusting for age) (Baumann et al., 2011). In the study of Swiss adolescents, however, trends reversed when adjusting for years since the onset of sexual intercourse instead of age.

Similarly, increased levels of seldom/never using condoms with temporary partners were found among Swedish women who reported early first sexual intercourse (Leval et al., 2011), while increased use of contraception has been reported among Icelandic (Bender & Kosunen, 2005) and US women (in their first relationship) who were older at first intercourse, yet age at first sex was not associated with uninterrupted use of contraception in first sexual relationship in the US study (Manlove, Terry-Humen, & Trends, 2007).

No association between early first sexual intercourse and condom use at most recent sexual encounter was found among a study of adolescents in the US (Sneed, 2009) and adolescent men in Norway (Kraft & Rise, 1991). Non-significant differences were also reported for non-use of contraception at most recent intercourse among men and women in the Norwegian study (Kraft & Rise, 1991), general contraceptive use among adolescent men in Iceland (Bender & Kosunen, 2005), pill and condom use at last intercourse among US adolescent men (Santelli et al., 1997) and condom use with temporary partners among men from Sweden (Leval et al., 2011). The only study reporting on emergency contraceptive use also reported no association for men or women (Ottesen, Narring, Renteria, & Michaud, 2002).

Other studies have reported increased use of oral contraceptives (ever) among Spanish women reporting early first sexual intercourse but no differences in ever using a condom (de Sanjose et al., 2008). Also in Spain, use of contraception in the past 4 weeks was less common among women aged 20 or older at first intercourse, compared with those aged 18–19 years, yet age at first intercourse was not associated with contraceptive use when only including those who did not use contraception at first intercourse (Ruiz-Munoz, Perez, Garcia-Subirats, & Diez, 2011).

Finally, associations may differ depending on the type of contraception being investigated. This was most clearly evidenced in the US study investigating contraception used at last sexual intercourse. Of the five types of contraception looked at, significant differences according to age at sexual debut were only found in three for men (no method, birth control pills only, dual methods) and three for women (no method, DMPA-injectable birth control only, dual methods) (Cavazos-Rehg et al., 2010b).

Discussion

Findings of this review suggest early first sexual intercourse is associated with having more recent, lifetime, and/or concurrent sexual partners. Research on other sexual behaviors has been sparse. The limited research available suggests early initiators have more diverse sexual experiences, including having sex more often, and higher prevalences of sexual practices such as oral sex, anal sex, and paying for sex. There is also some suggestion early initiators follow different patterns of partnership formation and dissolution, while findings on sexual difficulties and satisfaction have been mixed. Looking at reproductive outcomes, early first sexual intercourse has been associated with teen pregnancies and abortions, while studies reporting on STIs have been mixed, with some suggestion the relationships differ between bacterial and viral STIs. Mixed findings were also reported in the contraceptive literature.

In addition to synthesizing current understandings of the associations between early first sexual intercourse and subsequent sexual and reproductive outcomes, the review also revealed a number of issues with current understandings in the area.

First, definitions of early first sexual intercourse vary widely, with limited discussion or justification given for the definitions used. (The conceptualization and definition of age at/early first sexual intercourse is also an important issue for the broader sexuality field [de Irala, Osorio, Carlos, Ruiz-Canela, & López-del Burgo, 2011; Stigum et al., 2010].) Some studies have used age at first sexual intercourse as a continuous variable, while others have attempted to create categories separating those who had sex early from those who did not. The most common type of categorization has been to choose an age and anyone who reports sex before this age is said to have experienced early first sexual intercourse. As acknowledged by one author, however, "there is no consensus on a cut-off age for early sexual debut in the literature" (Baumann et al., 2011, p. 432) (see tables for variations in definitions). Other studies have looked at what was an early sexual debut relative to one's peers (see tables (Bozon, 1996; Else-Quest et al., 2005; Olesen et al., 2012; Sandfort et al., 2008)). For example, in a US study 25 % of participants were defined as having early sexual intercourse, this categorization

was done with reference to peers of the same gender, racial/ethnic background and educational attainment (Sandfort et al., 2008). Overall, these different types of definitions together with the many variations within each type have made it difficult to compare across studies due to the different states of social development and maturity captured by the definition. This has also made it inappropriate to conduct a meta-analysis as the exposure variable (early first sexual intercourse) is not consistent and cannot be standardised. Furthermore, nothing is currently known about if or how the different definitions impact findings in the area.

Second, data analyses have been inconsistent (at best) and incorrect (at worst). Little is currently known about how factors such as aging, and current relationship status impact the association between early first sexual intercourse and later sexual and reproductive outcomes. The effect of aging or growing older on these relationships has only been investigated in a limited number of studies despite the majority of studies adjusting their findings for age and relationship status (where applicable). To date, studies stratifying their analyses by age have reported mixed findings, some have reported the association between early first sex and subsequent outcomes to diminish with increasing age (Bozon, 1996; Kaestle et al., 2005); for other outcomes, differences between those who had sex early and those who did not were found to persist in older participants (Bozon, 1996; Buttmann et al., 2011; Johnson et al., 1994; Olesen et al., 2012). In addition, two studies have reported significant associations in older age groups but no differences according to age at first sex among younger participants (Buttmann et al., 2011; Magnusson et al., 2012). Even less attention has been paid to period (effects influencing individuals of all ages and can vary across time) and cohort effects (influence of when one was born).

Having a partner constrains or enhances the opportunity to experience certain sexual or reproductive behaviors and outcomes. It may be that those in a (monogamous) relationship have less opportunity to acquire large numbers of recent partners or have reduced risk of acquiring STIs (if their partner is also monogamous). Those in a relationship, however, may have increased opportunities to have sex more regularly or experience certain sexual practices. The Analysis of Sexual Behavior in France is currently the only primary study to explicitly stratify their findings by whether participants were in a relationship or not. In both groups, a higher proportion of early initiators reported multiple partners, however, the proportions and the magnitudes of the difference between early and late initiators (particularly among women) were vastly different between those currently in a relationship and those who were not (Bozon, 1996).

Baumann et al.'s (2011) study of Swiss adolescents suggested "Years since the onset of sexual intercourse" could be an important variable when investigating the association between early first sexual intercourse and later sexual and reproductive outcomes. When adjusting for years since the onset of sexual intercourse instead of age, associations between early first sex and three outcomes (sexual partners, pregnancy and condom use) were reduced and in a number of cases no longer significant or the association reversed.

These findings, however, are misleading. Including early sexual initiation and years since the onset of sexual intercourse in the same model removes the interpretability of each variable due to the relationship; age at first sexual intercourse + years since the onset of sexual intercourse = current age. Adjusting early sexual initiation for years since the onset of sexual intercourse is equivalent to investigating the association between current age and the outcome. This is because, when years since the onset of sexual intercourse is held constant, those who initiated sex earlier will be younger, while those who initiated sex later will be older. Although number of years sexually active is an important factor it does not provide any additional information independently of age at first sex and is included by default in any regression analysis that includes age at first sexual intercourse and age.

Third, it should be noted that, with the exception of the three studies investigating sexual satisfaction (Bozon, 1996; Rissel et al., 2003; Sandfort et al., 2008), the literature has generally been framed in a negative way, emphasizing risky outcomes, and ignoring the possibility that early initiators may experience positive sexual or reproductive outcomes.

The nature and parameters of the review also need to be taken into consideration. Only 12 citations explicitly investigated the associations between early first sexual intercourse and later sexual and reproductive outcomes. The majority of data came from studies in which the association was of secondary interest. Overall, these studies provide some useful data, yet there is often little justification for including age at first sexual intercourse as a predictor and little discussion about these findings.

Although every effort was made to identify all relevant citations, the nature of the literature and the search strategy employed potentially made it difficult to locate some citations, particularly those with non-significant findings. Locating the secondary studies was likely hampered by the search strategy employed. The lack of MeSH indexing around first sexual intercourse on common medical databases such as Medline and Embase necessitated the use of a title and abstract search as the main technique to locate literature. It is possible that the search terms (see above) were more likely to be located in the abstract if there was a significant association between early first sexual intercourse and the outcome of interest. Evidence of this was found in both the reference list search (Adimora et al., 2007; Eberhart-Phillips et al., 1998; Guzzo & Furstenberg, 2007; Jaffee et al., 2001; Kjær et al., 2007; Woodward et al., 2006) and the hand search (Manhart et al., 2006; Ottesen et al., 2002). First sexual intercourse was not mentioned in the title or abstracts of any of these six papers and about half reported non-significant findings. Thus the search strategy combined with the nature of the literature may have overstated the association between early first sex and sexual/reproductive outcomes among papers where early first intercourse was not the primary exposure variable; however, the exact bias is unknown.

Furthermore, the parameters of the review excluded a number of potentially important factors, including the context of first sex (e.g., coercion, money for sex or violence), how age at first sexual intercourse differs across different sexual identities and broader factors associated with early first sexual intercourse. Another potential limitation of the search strategy is the lack of gray literature and unpublished work.

Conclusion and Future Research

It is almost taken for granted and assumed that those who experience early sexual intercourse will inevitably proceed to risky (and negative) sexual and reproductive outcomes. The findings of this review suggest that those who engaged in early first sex most likely do experience more diverse sexual and reproductive outcomes, for example more sexual partners, different sexual practices and repertoires, a greater likelihood of teen pregnancy, and in some situations, be more likely to ever have an STI. Many of the studies, however, also reported no differences between those who experience sex early and those who do not.

These findings, however, must be interpreted with caution for a number of reasons. First, there is currently no consensus in what constitutes early first sexual intercourse when looking at the associations between early first sex and later sexual and reproductive outcomes. The effect this has on current understandings in the area is unknown and needs to be further investigated using population-based studies. Second, data have been poorly or incorrectly analyzed. In addition to considering factors such as aging and relationship status in future research, a thorough examination of each is needed to examine whether or not they have distorted or biased current understanding in the area.

Although not part of this review, further research is needed to investigate the associations across different sexual identities and how context of first sexual intercourse influences later outcomes. A parallel systematic review investigating factors associated with early first sexual intercourse would also enrich knowledge about the associations between early first sexual intercourse and later sexual and reproductive outcomes.

Given the limitations and issues with current understandings of the associations between early first sexual intercourse and later sexual and reproductive outcomes, without further research and an attempt to standardised methodologies, including an agreed upon definition of early first sexual intercourse, it is hard to make confident evidence-based predictions and recommendations for public policy. It is also inadvisable to use current knowledge about the association between early first sexual intercourse and later sexual and reproductive outcomes as justification for funding programs.

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