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ADOLESCENT REPRODUCTIVE ATTITUDES AND KNOWLEDGE EFFECTS ON EARLY ADULT UNINTENDED AND NONMARITAL FERTILITY ACROSS GENDER

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Adolescent Reproductive Attitudes and Knowledge Effects on Early Adult Unintended and Nonmarital Fertility Across Gender

Abstract

Theory and evidence suggest strong short-term effects of attitudes toward and knowledge about reproduction on women's fertility. Adolescent attitudes and knowledge may also have longer-term implications about the contexts women perceive as appropriate for childbearing and their capacity to manage their preferences. Although previous research on men's fertility is limited, theory would suggest that these processes apply to men as well as women (with possible variations given the gendered meanings of sex, contraception, and reproduction). We analyze the relationship between reproductive attitudes and knowledge in adolescence and unintended and nonmarital first and second births in early adulthood, using the National Longitudinal Study of Adolescent to Adult Health (N = 9,431). Adolescent reproductive attitudes, especially life course consequences of early childbearing, predict the intendedness and marital status of first and second births. Adolescent reproductive knowledge is more often linked to the context of second births than first births. These associations vary by gender, but the overall results suggest that fertility schemas developed during adolescence predict behavior into early adulthood.

Highlights

- Adolescents' attitudes and knowledge about reproduction predicts adult childbearing.
- Adolescent concerns about the costs of early pregnancy predict adult childbearing.
- Adolescent reproductive knowledge predicts second births more strongly than first births.
- Adolescent attitudes and knowledge predict childbearing differently for men and women.

Fertility attitudes – general evaluations of possible positive or negative aspects of childbearing – are associated with reproductive behavior. Attitudes both contribute to the formation of more specific plans (fertility intentions) and influence behavior independent from consciously-formulated plans. Multiple widely-used theoretical frameworks unpack the specific ways that attitudes shape demographic behaviors, including the theory of planned behavior (TPB; see Fishbein & Ajzen, 2010; Philipov, Thévenon, Klobas, Bernardi, & Liefbroer, 2009), the traits-desires-intentions-behaviors model (TDIB; see Miller 1994, 1995; Miller, Severy, & Pasta, 2004), and the cognitive-social model (Bachrach & Morgan, 2013). Demographers and family planning experts also recognize the importance of reproductive and contraceptive knowledge for sexual, contraceptive, and childbearing behaviors (Bongaarts, 2006; Clark, Baldwin, & Tanner, 2007; Dehlendorf et al, 2010; Rocca & Harper, 2012). In fact, one of the core models of 20th century demography, Coale's preconditions for fertility decline, articulated the joint importance of attitudes (ready, willing) and the capacity to implement these attitudes (able) (Coale, 1973).

Most previous research linking these psychosocial characteristics to reproductive behaviors analyzes a relatively short time frame, often using cross-sectional data or survey waves a few years apart. Recent evidence suggests, though, that attitudes and knowledge are linked to reproductive behaviors over the long term (Garfield et al., 2016; Guzzo & Hayford, 2018; Guzzo, Hayford, & Lang, 2019; Shattuck, 2017, 2019). In particular, attitudes and knowledge developed during adolescence, a formative life course stage that establishes foundational values and skills, may persist into early adulthood and shape later reproductive behavior, including contraceptive use, birth rates, and the timing and relationship context of births.

Drawing on longitudinal data from the National Study of Adolescent to Adult Health (Add Health), we use multidimensional measures of adolescent reproductive attitudes and

knowledge to predict experiences of unintended and nonmarital fertility later in the life course, looking at both first births and second births. We further consider whether the long-term associations of adolescent reproductive attitudes and knowledge with fertility vary by gender. Adolescent boys and girls receive different messages about sex, contraception, and pregnancy (Fennell, 2011; Hust, Brown, & Ladin, 2008), and there are gender differences in how people are socialized into parenting roles (Walzer, 1998). This research adds to the small but growing body of work on the long-term impacts of adolescent context as well as research studying the influences on men's childbearing behaviors. We move beyond previous research on reproductive attitudes and knowledge by incorporating both sets of constructs in our analyses, by analyzing both women and men, and by studying higher-parity births.

Adolescent Reproductive Attitudes and Knowledge and Fertility Behavior

Adolescent attitudes and knowledge about reproduction predict short-term fertility behaviors (Deptula, Henry, Schoeny, & Slavik, 2006; Driscoll, Sugland, Manlove, & Papillo, 2005; Jaccard, Dodge, & Dittus, 2003; Mollborn, 2010; Schneyderman & Schwartz, 2013). This association is usually interpreted as evidence that attitudes and knowledge reflect teens' contemporaneous assessment of how having a child would fit into their lives and their access to, and level of comfort with, various contraceptive methods (Brückner, Martin, & Bearman, 2004; Frost, Lindberg, & Finer, 2012; Hayford, Guzzo, Kusunoki, & Barber, 2016; Ryan, Franzetta, & Manlove, 2007). A smaller body of research suggests that the associations between attitudes, knowledge, and reproductive behavior persist over a longer time period and for a wide range of outcomes (Guzzo & Hayford, 2018; Guzzo, Hayford, & Lang, 2019; Guzzo, Hayford, Lang, Wu, Barber, & Kusunoki, 2019; Shattuck, 2019). Most of this emerging body of research has focused on relatively straightforward behavioral outcomes such as birth timing or contraceptive use. A

few studies, however, have conceptualized the long-term consequences of early-life characteristics more broadly to consider how attitudes and knowledge are related to the context of childbearing. For example, Shattuck (2017) found that teen girls who said they would not consider a nonmarital birth were more likely, in early adulthood, to have postponed their first birth and, if they had a birth, to have had a marital rather than a nonmarital birth. Garfield and colleagues (2016) found that teen boys' attitudes about sex and pregnancy predicted early fatherhood and whether fathers lived with their children. Further, attitudes toward life course domains that compete with childbearing, such as career and educational aspirations, are also linked to childbearing (Barber, 2001; Driscoll, Sugland, Manlove, & Papillo, 2005).

Building on these studies, which primarily focus on the transition to parenthood, we situate adolescent attitudes as part of the larger development of fertility schemas. Specifically, we suggest that adolescent attitudes about specific aspects of early fertility tap into a broader set of ideas about childbearing that influence not only the transition to parenthood but higher-parity births as well. For instance, consider the extensive research exploring how the meaning of childbearing is situated in family, neighborhood, and life course contexts (e.g., Bute & Jensen, 2010; Edin & Kefalas, 2005; Edin & Nelson, 2013; Harding, 2007; James-Hawkins & Sennott, 2015; Jensen & Bute, 2010; Mollborn, 2010, 2017). This research shows that attitudes toward childbearing are not only a concrete assessment of practical costs and benefits of childbearing at a particular point in time or under particular circumstances but represent elements of a larger system of meaning connecting childbearing with ideas about family, work, and parenting—in other words, a childbearing "schema" (Johnson-Hanks, Bachrach, Morgan, & Kohler, 2011).

Fertility schemas are likely learned and adopted in adolescence as teenagers begin forming romantic relationships while they also begin planning for the future more concretely—

for instance, deciding whether to take college prep courses or adopting more adult roles, such as getting a job. Although attitudes and values evolve as people grow up, the ideas to which children and adolescents are exposed are a formative influence on later-life beliefs (e.g., Johnson-Hanks et al. 2011; Pearce & Davis 2016; Yabiku, Axinn, & Thornton 1999). Thus, although adolescent reproductive attitudes are often measured in ways that are specific to teen fertility, we argue that they reflect broader and more durable schemas about the meaning of childbearing. Teens who perceive that early childbearing would be embarrassing to one's family, for example, may have ideals about the appropriate time and context for having children that mean that they are also likely to disapprove of nonmarital childbearing later in life. Teens who view birth control more favorably may be those who also view fertility as something to be planned, and they may have fewer unintended births. As such, we expect that teens' attitudes about pregnancy and birth control are predictive of the meaning they assign to childbearing and the contexts in which they have children.

In this article, we also incorporate knowledge about contraception and reproduction as concepts developed in adolescence with potentially long-term consequences. All individuals of childbearing age need accurate knowledge about reproduction and contraception to manage their reproductive behavior. Women have more than 30 years of potential fecundity, with men able to reproduce throughout most of their adult lives, yet both men and women in industrialized societies generally think families of two to three children are ideal and prefer to have children relatively closely spaced together (Organisation for Economic Co-Operation and Development, 2016; Saad, 2018). To achieve these reproductive goals, individuals need to understand the basic biology of human reproduction (such as when during the menstrual cycle women are most likely to become pregnant) and how to avoid pregnancy (i.e., contraception). This information is

usually taught during adolescence, when individuals go through puberty and become able to have children. In the U.S., however, schools vary substantially in the availability, content, and accuracy of sex ed programs; this was especially true of the 1990s, when our analytical sample was first surveyed, but remains true today (Hall, Sales, Komro, & Santelli, 2016; Lindberg, Maddow-Zimet, & Boonstra, 2016). And unfortunately, adults have few opportunities to learn more, and more accurate, information (Kottke, 2014) even as both the desire for children and the need to manage conception increase as men and women age, form sexual relationships, and enter into normative family-building life course stages. Thus, what men and women know as adults about sex, reproduction, and contraception may differ little from what they learned as teens. Consistent with this argument, research shows that teens' reproductive knowledge predicts contraceptive method choice and consistency into early adulthood (Guzzo & Hayford, 2018; Guzzo, Hayford, Lang, Wu, Barber, & Kusunoki, 2019). In this article, we extend this line of research to consider the long-term behavioral correlates of adolescent reproductive knowledge.

The Context of Childbearing

Our overarching hypothesis is that reproductive attitudes and knowledge measured in adolescence reflect persistent orientations to childbearing and contraception that, in turn are associated with fertility outcomes in early adulthood – not just whether people have children, but when and under what circumstances. We focus on two indicators of the circumstances in which people have children, whether births are intended and whether births take place in marriage. These indicators are not, of course, the only salient aspects of childbearing context, but they reflect important dimensions of how people think about reproduction (and have attracted substantial attention from scholars and policymakers).

Adolescent attitudes and knowledge and subsequent unintended fertility

In demographic, public health, and clinical research, a birth is considered "unintended" if it occurs at a time when the individual did not want to have a child. Better knowledge about contraception and reproduction allows people to select more effective contraceptive methods and use them more consistently and is therefore associated with lower risks of unintended fertility (Frost et al., 2012). In addition, survey measures of unintended births also reflect an orientation toward childbearing. For some people, births are something to be planned (Kaye, Suellentrop, & Sloup, 2009). For others, however, births may be something that just happens. For example, a survey of reproductive-age women in the United States found that about a third of the sample agreed with the statement that "It doesn't matter whether I use birth control, when it is my time to get pregnant, it will happen," and another nationally representative survey found that about one-quarter of sexually active women of reproductive age were neither trying to get pregnant nor trying to avoid pregnancy but "okay either way" (Jones, 2018; McQuillan, Greil, & Shreffler, 2011). Thus, an unintended birth may reflect a view that births are not something to be actively planned, rather than a failure of planning (Aiken et al., 2016). Adolescent fertility attitudes that include strong beliefs about the appropriate time and place for childbearing may be indicative of a planning orientation toward childbearing and may therefore be associated with lower levels of later unintended fertility, even net of reproductive knowledge.

Adolescent attitudes and knowledge and subsequent nonmarital fertility

Even as nonmarital fertility has become increasingly common in the United States, more than six in ten Americans believe that individuals who want children should get married (Nousak, 2018). At the same time, increasing numbers believe that childbearing outside of marriage is an acceptable option (Stykes, 2015). Schemas in which marriage and childbearing are tightly linked

coexist with schemas in which marriage and childbearing are individual choices that can be separated or combined according to individual circumstances and preferences. Beliefs about the acceptability of nonmarital childbearing as reported in adolescence are associated with later fertility behavior (Shattuck, 2017, 2019), suggesting that these schemas develop early in the life course and persist into the transition to adulthood. Adolescents with more negative views toward teen childbearing may also have more narrow ideals about appropriate contexts for childbearing at any life course stage and thus may be less likely to have nonmarital births in early adulthood.

In practice, because most people in the United States see marriage as the preferred context for childbearing, births outside of marriage are less likely to be deliberately intended, and the categories of "unintended" and "nonmarital" are overlapping. But this overlap is loose. In our analytical sample, for instance, 39% of nonmarital first births were intended (authors' calculations, births by Wave IV). Conversely, 20% of marital first births were unintended. Thus, unintended and nonmarital births seem to capture related but distinct aspects of birth contexts, and we therefore analyze such births in two separate analyses. In order to understand the evolving impacts of adolescent attitudes and knowledge, it is important to analyze not just whether births take place, but the union context and intention status of these births. This leads us to our first research question:

Research Question 1: Are adolescent reproductive attitudes and knowledge associated with variation in the union context and intention status of births in early adulthood?

In general, we expect that teens with attitudes more favorable to birth control and less favorable to early childbearing – and with the knowledge and confidence to enact their preferences – would be less likely to have both nonmarital and unintended births. To the extent that the attitudinal measures tap into the preferred context of childbearing, these may be more

strongly related to marital status than intendedness. Measures of reproductive knowledge, which reflect the ability to plan and control one's reproductive behaviors, may be more strongly linked to the intendedness of births.

Unlike most prior research, we take this a step further to consider higher-parity births. If reproductive attitudes and knowledge do, in fact, represent broader and more deeply entrenched fertility schema, then they should continue to be associated with fertility behavior after the first birth. Alternatively, if adolescent attitudes and knowledge largely reflect the views of those at younger ages and who have not (yet) had children, they would be less strongly linked – or not linked at all – to the timing and context of a higher-parity birth, especially when accounting for the context of the first birth (as the context of a lower-parity birth strongly influences the context of higher parity births (Guzzo & Hayford, 2011; Rajan et al., 2017)). Looking at both first and higher-order births provides a stronger test of the notion of adolescent attitudes and knowledge as indicative of lifelong schema.

Gender and Fertility Behaviors

The vast majority of fertility research has focused on women's fertility (Greene & Biddlecom, 2000); research on attitudes, knowledge, and fertility is no exception. As such, the psychosocial factors that influence men's behaviors—and whether they are similar to those that influence women's behaviors—remain largely unknown. Some analyses have linked adolescent knowledge to adolescent contraceptive behaviors for men and women (e.g., Rock, Ireland, Resnick & McNeely, 2005; Ryan, Franzetta, & Manlove, 2007), but generally there is little research on adolescent boys' attitudes about childbearing. To the best of our knowledge, the only study to connect adolescents boys' attitudes to early adult fertility is from Garfield et al. (2016); this

study did not include women and so could not make direct comparisons across gender about the adolescent attitudinal and knowledge antecedents of subsequent fertility behaviors.

Given different socialization about sex and childbearing and differing reproductive biology, adolescent girls may have different reproductive attitudes and knowledge than boys. Even if attitudes and knowledge are similar for boys and girls, they could be differentially associated with early adult fertility if women weigh childbearing decisions differently than men. For instance, women are socialized about the motherhood role in ways that are unlikely to be paralleled for men and fathers due to the different societal expectations of mothers and fathers (Adamson, 2010; Allen & Hawkins, 1999; Stryker, 1987; Walzer, 1998). Men also tend to view fatherhood and partnership as part of a "package deal," probably in ways that women do not given the physiological nature of childbearing (Edin & Nelson, 2013; Schoppe-Sullivan et al., 2008; Townsend, 2002). Thus, it is unclear whether adolescent attitudes and knowledge would be associated with early adult fertility behaviors like unintended and nonmarital fertility in the same way for men and women. As such, we have our second research question:

Research Question 2: If adolescent reproductive attitudes and knowledge are associated with the timing, relationship context, and intention status of births in early adulthood, does this association vary by gender?

Overall, we expect that the association between adolescent attitudes and knowledge and early adult fertility will be stronger for women than for men. However, one challenge in addressing this research question is that the quality and accuracy of men's fertility information in survey data is questionable (Joyner et al., 2012). Young men report fewer births on surveys than would be expected based on other data sources, with nonmarital births particularly under-reported. Part of the under-reporting of young men's fertility is related to sampling issues: men

in their teens and early 20s are more likely to be tenuously attached to homes (Kendall et al., 2005), incarcerated or institutionalized, or in the military—all statuses that limit the chances they appear in household-based surveys. As teens and young adults enter their late 20s, though, risk-taking and instability decline (Rocque, Posick, & White, 2015), and men may be more likely to be surveyed—and report children (Aughinbaugh & Gardecki, 2007). It is also possible that, conditional on reporting a birth, the associations between adolescent attitudes, knowledge, and early adult fertility would nonetheless represent valid associations. We therefore proceed with our analysis of men's fertility, while exercising caution in interpreting results.

Current Study

We test whether adolescent reproductive attitudes and knowledge predict the context of childbearing by not only examining first births, which may "set the stage" for a number of family-related behaviors and affect the attainment of subsequent human capital (Guzzo & Hayford, 2011; Rajan et al., 2017; Rindfuss & St. John, 1983), but second births as well. Higher-parity and repeat unintended or nonmarital births likely reflect persistent difficulty in managing reproductive behaviors. In addition, it might be expected that adolescent attitudes and knowledge are more strongly associated with first births than with later fertility, since after the first birth individuals' experiences of parenting may become a more salient influence than early-life attitudes; if adolescent attitudes and knowledge remain an important predictor, this provides support for the broader argument that adolescence is key for forming deeper family schema. Thus, in our first set of analyses, we predict first births, using discrete time event history methods in which we separately model unintended fertility and nonmarital fertility. In the second set of analyses, we repeat the prior analysis among those with at least one birth, predicting the transition to a second birth and controlling for first birth context. These analyses provide a

conservative estimate of the total association between adolescent attitudes and knowledge and second births, since first birth context could be considered a mechanism connecting early outlooks with later fertility behavior. For instance, having an unintended first birth is associated with a higher likelihood of reporting a second birth as unintended (Guzzo and Hayford, 2011). The main theoretical goal of this article is to understand the degree to which adolescent attitudes and knowledge reflect schemas about childbearing that persist into adulthood. We are therefore primarily interested in the "direct effect" of adolescent attitudes and knowledge on later childbearing, i.e., the effect beyond the any impact mediated by first birth context. All models are run separately by gender, and we test for differences between men and women in the association between our measures of reproductive attitudes and knowledge and fertility behaviors.

We account for key socioeconomic and demographic variables associated with fertility intendedness and marital status, including age, race-ethnicity, nativity, family structure and socioeconomic status during adolescence, and educational attainment (Finer & Zolna, 2016; Kim & Raley, 2015; Rajan et al., 2017). The rich data in Add Health also permit us to account for psychosocial characteristics linked to fertility behaviors, including religiosity, college aspirations, academic aptitude, and locus of control (Guzzo, Hayford, & Lang, 2019; Hayford & Morgan, 2008; Rajan et al., 2017) and to control for exposure to sex ed (Kirby & Lepore, 2007).

Data and Methods

The analyses used the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative school-based sample of adolescents surveyed in 1995 (Wave I), 1996 (Wave II), 2001-02 (Wave III), and 2007-08 (Wave IV). At Wave I, 20,743 adolescents in grades 7-12 were interviewed, including oversamples. At Wave IV, from which we drew fertility

outcomes, 15,701 respondents were re-interviewed when they were ages 24-32. Fertility outcomes measured at Wave IV include a full retrospective birth history for all respondents; thus, we capture births throughout the adolescent and early adult years[1]. We restricted the sample to those with valid longitudinal weights (excluding 901 respondents, from the oversamples). The questions used to indicate reproductive attitudes and knowledge (discussed below) were only asked of adolescents aged 15 and older at Wave I, excluding 4,357 respondents. We excluded 956 respondents with pregnancies prior to Wave 1 to establish temporal ordering and dropped an additional 56 respondents with missing or inconsistent information on the dependent variables (discussed below). The sample was comprised of 9,431 respondents (4,996 women and 4,435 men) at risk of a first birth, and 4,685 respondents at risk of a second birth, who were 15 and older at Wave I, did not have a birth prior to Wave I, and who participated in the Wave IV survey and had valid longitudinal weights.

To indicate reproductive attitudes and knowledge, we adopted the factor structures outlined in Guzzo et al. (2019). The factor structure for reproductive attitudes was comprised of 12 items and identified three underlying constructs (Table 1). The first construct, *negative feelings toward pregnancy,* assesses how respondents feel about a hypothetical pregnancy and is comprised of two items. The second construct, *negative life course consequences of early childbearing,* measures how a hypothetical pregnancy, and specifically a pregnancy during adolescence, would impact particular aspects of the respondent's life and is comprised of four items. The third construct, termed *positive birth control attitudes,* represents the respondent's

[1] Wave III of Add Health would theoretically provide birth information for those who did not participate in Wave IV. Unfortunately, as discussed in Schoen, Landale, and Daniels (2007) and Amato et al. (2008), a substantial number of births were omitted due to confusion over question wording in the survey; these births can be partially recovered for mothers through the household roster but not for fathers. Given the gender focus of the current analysis, this limitation precludes using Wave III fertility data.

overall orientation towards contraception and is comprised of six items; we interpret this factor as how "costly" (on a social, relational, and financial basis) it is to take steps to avoid pregnancy. Note that items were recoded so that higher scores reflect a stronger orientation toward preventing pregnancy (less favorable attitudes toward pregnancy/childbearing or more favorable attitudes toward birth control); the original coding for all reproductive attitudinal items was a five-point Likert scale of 1 = strongly agree to 5 = strongly disagree.

For reproductive knowledge, the factor structure was comprised of nine items and also identified three underlying constructs (Table 1). The first construct, termed *female reproductive biology knowledge,* represents respondents' knowledge of the physiological aspects of female reproduction and is comprised of two items. The second construct, termed *condom knowledge,* describes the respondent's overall knowledge of condoms and how to use them effectively and is comprised of four items. The final construct, termed *birth control confidence,* identifies how confident individuals feel about their general knowledge of some specific contraceptive methods and is comprised of three items. Reproductive knowledge items were recoded so that higher scores reflect more accurate knowledge and greater confidence. The questions comprising female reproductive knowledge and condom knowledge were originally measured on a true/false basis. The questions comprising birth control confidence used the same five-point Likert scale as above to indicate agreement with the statement "You are quite knowledgeable about…" for each method, and we dichotomized these items as strongly agree/agree versus all other responses for consistency across the knowledge measures. To ensure that the factor structures could be used to explore and explain gender differences, we tested for metric invariance across gender and conducted the factor analyses separately by gender (not shown). Both analyses confirmed that the identified constructs and their interrelationships are equally valid for men and women.

- Table 1 here -

From these two factor structures, we used the items that were identified as contributing to each factor and averaged the recoded values on the items in each factor to create variables representing the underlying constructs. In supplementary models (not shown), we used factor scores (i.e., averages of the items that are weighted based on factor loadings) rather than simple averages, and the results were substantively similar, though factor loadings produced somewhat weaker associations for measures with fewer items. We chose to use simple averages rather than factor scores because the former are more intuitive and straightforward to interpret, especially for comparisons across groups.

To investigate the context of fertility, our dependent variables were taken from Wave IV, when the analytical sample was in their late 20s and early 30s (92% were between the ages of 28 and 32). Add Health has detailed information for each birth, including intendedness and union status at birth. For each birth, intendedness was measured with the question, "Please think back to the time just before you became pregnant. Did you want to have a child then?" Responses were categorized as 'no', 'yes', and 'don't know'. We dichotomized the responses, with those answering 'yes' categorized as an intended birth, and those answering 'no' or 'don't know' as unintended.[2] For each individual, we created measures of intendedness and union status for all births,[3] though we do not analyze third or subsequent births because less than 10% of the analytical sample had such births given its relatively young age. For unintended births, we

[2] In surveys primarily designed to measure fertility, a distinction is usually made between "unwanted" births (births that took place when the respondent did not want any (more) children) and "mistimed" births (births that took place sooner than the respondent wanted). The term "unintended" is typically used as an umbrella term that includes both unwanted and mistimed births. The question wording in Add Health suggests that the concept being measured is closer to "unintended" than "unwanted," and so we use that term throughout the paper.

[3] The majority of first births observed in the analytic sample take place to people in their 20s – about 44% to people age 20-24 and 39% at age 25 or older, with 13% occurring among 18-19 year olds and 4% to those younger than 18.

created a three-category time-varying variable: no birth, intended birth, unintended birth. For nonmarital births, we also created a time-varying categorical measure: no birth, marital birth, nonmarital first birth. In preliminary analyses, we explored disaggregating nonmarital births by cohabitation status at birth as well as grouping cohabiting births with marital births (not shown). These results indicated that, in terms of the key independent variables, cohabiting births more closely resembled non-union births than marital births, and so we grouped cohabiting births with non-union births into the broader category of nonmarital.

We also included a wide range of demographic, socioeconomic, and psychosocial measures that may be correlated with both reproductive attitudes/knowledge and fertility outcomes. Time-invariant demographic and socioeconomic characteristics, measured at Wave I, included race-ethnicity, nativity status, family structure at the time of the interview, and family socioeconomic status (using Bearman and Moody's (2004) operationalization, which combines information on occupation and education for both mothers and fathers to create an index for each parent ranging from 1-10 and then uses the higher of the two scores). Psychosocial variables, also time-invariant and taken from Wave I, included a dichotomous indicator of whether the respondent had sex by Wave I, whether the respondent reported ever discussing pregnancy or AIDS in school (a proxy for sex ed), religiosity (a scaled variable of four items about religious service attendance, participation in youth activities, prayer, and importance of religion, $\alpha = 0.85$), the Peabody Picture Vocabulary Test (an aptitude test), a scaled measure of the respondent's locus of control (with eight items such as "when you have a problem to solve, one of the first things you do is get as many facts about the problem as possible" and "when you get what you want, it's usually because you worked hard for it," $\alpha=0.63$). Finally, respondents were asked two separate questions about whether they wanted to attend college and whether they expected they

actually would attend, both on a scale of 1 to 5; we combine those who reported both highly wanting and expecting (scores of 4 or 5) vs lower scores to proxy education aspirations that might also influence the timing and context of fertility. In the analyses predicting second births, models predicting intendedness include a dichotomous indicator of whether the first birth was unintended, and models predicting marital status include a dichotomous indicator of whether the first birth was nonmarital.

We also include several time-varying variables. Age is a time-varying categorical indicator (15-19, 20-24, 25-29, and 30+). For first births, we include a measure of months since Wave I to account for exposure to childbearing; in the model predicting second births, we include months duration since first birth. For education, we used a four-category time-varying measure (less than high school, high school degree or GED, Associate's degree, or Bachelor's degree or higher). Individuals who attended college but did not complete a degree are included in the high school category. To construct this variable, we used data from Waves III and IV. [4]

Analyses

We begin by presenting descriptive information on experiences of unintended and nonmarital births for men and women. We then show the results from two multivariable discrete-time event history multinomial logistic models predicting births by intendedness. The first model predicts intended vs. unintended first births; the second predicts intended vs. unintended second births

[4] In Wave III, respondents were asked the month and year of high school graduation. However, this information was not collected again for respondents who participated in Wave IV but who had not participated in Wave III; instead, there was only information on whether they had finished high school. For these respondents, we assigned a June graduation month for the year they would have graduated high school based on their grade at Wave I and assuming no repeated grades. An examination of the Wave III data showed that following this assumption for those that did participate in Wave III corresponded with the actual month and year of graduation in 85% of cases, with most of the remaining 15% largely due to graduation dates in May or July. Grade retention (i.e., repeating a grade) is rare in higher grades; for instance, less than 3% of ninth-graders repeated a grade in the years 1995-2010 (Warren, Hoffman, & Andrew, 2014). The Wave IV data also contained information on the year respondents obtained Associate's and Bachelor's degrees, but the month was not included. Following other work using these data (e.g., Augustine, 2016), we assigned a May graduation date to respondents with a post-secondary degree.

among those who had a first birth, controlling for the intendedness of the first birth. We then present similar models for marital and nonmarital first and second births. All models are run separately for men and women, and we compare the coefficients across gender for our key independent measures of reproductive attitudes and knowledge using Wald Chi-square tests. For the analyses of first births, respondents enter at the month of the Wave I survey; for the analyses of second births, respondents enter the month after the first birth. For all analyses, respondents exit at the month of birth or are censored at the month of the Wave IV survey if they do not have a birth.

To account for the sampling design of Add Health, all analyses are weighted with Wave IV longitudinal weights using Stata 15's *svy* commands. Although we did not impute the dependent variables or the key independent variables, we used multiple imputation for missing data on the control variables using Stata's *mi* commands. Missing data was most common for the Wave I aptitude test scores, at just over 400 cases; 20 or fewer cases were imputed for other measures (Wave I: locus of control, wanting/expecting to go to college, learning about pregnancy or AIDs in school; Wave IV: education).

Results

Descriptive Results

Table 2 shows fertility information separately by gender, looking at first and second births by Wave IV. Given the later age profile of childbearing for men than women, it is not surprising that fewer men report having any children. More than half of men (57%) have no children whereas only 42% of women have no children.[5] Among the full sample, then, a considerably

[5] These figures are similar to the National Survey of Family Growth, largely regarded as the best survey source of fertility data in the U.S. For comparison, in NSFG 2006-10 (weighted to 2008, which is when the bulk of Wave IV was interviewed), of men and women 26-32, 58% of men and 42% of women were childless (authors' calculations).

higher proportion of women than men report having an unintended first birth (24% vs. 17%). For those with a first birth, fewer men (51%) report a second birth than women (59%), and more women reported an unintended second birth than men (19% vs. 15%). A similar pattern exists for nonmarital births, with 29% of women reporting a nonmarital first birth and, of those with a first birth, 22% reporting a nonmarital second birth. For men, the equivalent numbers are 21% and 17%. The significant differences across gender in these distributions is due to men's lower propensity to have a child; among those with a first birth, there are no significant differences in the percentage of men and women who characterize their births as unintended (58% vs. 61%) or have a nonmarital birth (49% vs. 51%), not shown. Similarly, for second births, the distributions of unintended and nonmarital births are not significantly different for men and women among those with second births. Seventy percent of women and 68% of men with a second birth characterized that birth as unintended, and 67% of women and 63% of men with a second birth had a nonmarital birth (not shown).

– Table 2 here –

Table 3 shows, separately by gender, the weighted descriptive statistics of the covariates in the multivariable models for the full analytical sample at risk of a first birth. We first discuss adolescent reproductive attitudes, which have a range of 1-5; recall that these are coded so that higher scores mean more negative views toward teen pregnancy and more favorable attitudes toward birth control. Both adolescent men and women had rather negative attitudes toward having a child during adolescence, at 4.36. Perceptions of the negative life course consequences of early pregnancy were also fairly high, though women reported a statistically significant higher average (3.51) than men (3.40). Women (4.09) also had more positive adolescent attitudes

This provides reassurance that Wave IV of Add Health does seem to capture and identify both mothers and fathers, at least as well as other fertility datasets.

toward birth control compared to men (3.86), though both were generally favorable. Turning to reproductive knowledge, adolescent female reproductive biology knowledge is measured as the number of correct answers to two true/false questions, and both men and women averaged one correct answer. For adolescent condom knowledge, which ranged from 0-4 based on the number of correct answers to four questions, women (2.88) reported a higher average than men (2.79). Birth control confidence is measured as strongly agreeing/ agreeing that one is knowledgeable about three types of methods (thus ranging from 0-3); men (2.15) report significantly higher confidence about their knowledge than women (1.98).

– Table 3 here –

There were few other differences by gender in the analytical sample. A higher proportion of teen girls (91.5%) reported discussing pregnancy or AIDS in school than teen boys (88.2%), and more girls highly wanted and expected to attend college than boys (56.3% and 43.9%, respectively). Teen boys had statistically higher scores on the aptitude test at Wave I than girls, though the magnitude of the difference was small. By Wave IV, women had significantly greater educational attainment than men.

Multivariable Results

Next, we turn to multivariable analyses. We present parallel results for unintended and nonmarital fertility, beginning with an event history model that predicts first births and then moving to the event history model predicting second births. We show the results separately by gender and control for a full set of socioeconomic and demographic covariates, though we do not show or discuss the covariates in the main text (see Appendices A-D). Statistically significant differences across gender for the association between reproductive attitudes/knowledge and fertility (from Wald chi-square tests) are indicated by shading in the tables.

Table 4 shows the relative risk ratios (RRRs) from models predicting first births. For women, perceiving more negative life course consequences for an early pregnancy as an adolescent is associated with a greater likelihood of having no birth relative to having an unintended first birth (RRR = 1.27) and a lower likelihood of an unintended than an intended first birth (RRR = 0.82). Women who had more negative overall attitudes toward pregnancy as an adolescent are more likely to have no birth than to have an intended birth (RRR = 1.22). That is, negative attitudes about childbearing in adolescence, along two dimensions, are associated with reduced risk of later unintended fertility. Birth control confidence is also significantly associated with fertility, but in an unexpected direction – women who reported greater birth control confidence in adolescence are less likely to have no birth relative to an unintended first birth (RRR = 0.91). For men, perceiving greater life course consequences of an early pregnancy during adolescence increases the likelihood of having no birth relative to having an intended first birth (RRR = 1.13). Adolescent birth control attitudes are also a significant predictor of first births and birth intendedness, with more favorable attitudes reducing the likelihood of no birth or an unintended birth relative to an intended birth (RRR = 0.88 and RRR = 0.78), respectively.

Comparing across gender, negative perceptions of the life course consequences of an early pregnancy have a significantly different, and more negative, impact for women than men on the risk of an unintended first birth relative to an intended first birth. For men, though, more favorable birth control attitudes are more strongly, and negatively, linked to an unintended than intended birth than is the case for women.

– Table 4 here –

Turning to second births in Table 5, there is some evidence that adolescent attitudes and knowledge affect the context of higher-parity births. Recall that these models show associations

net of first birth intendedness; that is, they reflect the degree to which attitudes and knowledge are independently associated with second birth timing and context beyond any impact mediated by first birth context. These associations can be interpreted as showing the effects of attitudes and knowledge over and above the influence of life experiences, including with early childbearing, rather than the total association of attitudes and knowledge with later behavior. As expected, for both men and women, an unintended first birth reduces the risk of no birth vs. an unintended birth but increases the risk of either no birth or an unintended birth relative to an intended birth (these associations do not differ by gender). But net of the direct link between first and second births, women who had more positive birth control attitudes as adolescents are also more likely to have no second birth than an intended birth (RRR = 1.16), as are those who had more accurate knowledge about female reproductive biology during adolescence (RRR = 1.24). (Negative consequences of an early pregnancy just misses significance, at p=.051, when predicting no second birth vs. an unintended birth for women). Adolescent reproductive biology knowledge is also associated with a lower risk of an unintended birth relative to an intended birth among women (RRR = 0.81).

– Table 5 here –

For men, adolescent female reproductive biology knowledge is the only factor significantly associated with second birth intendedness, increasing the chances of no birth vs. an intended birth (RRR = 1.17) but, unexpectedly, also increasing the risk of an unintended birth vs. an intended birth (RRR = 1.34). Comparing across gender, we see that adolescent female reproductive biology knowledge decreases the risk of unintended births but for women only; for men, in contrast, more knowledge decreases the risk of intended births.

Table 6 shows the results from event history models predicting first births by marital status. Women who had more negative overall feelings toward pregnancy as adolescents are more likely to have no birth than to either a nonmarital or marital first birth (RRR = 1.14 and RRR = 1.20). Perceiving greater life course consequences of early pregnancy increases the likelihood of having no birth relative to having a nonmarital first birth (RRR = 1.28) and reduces the likelihood of a nonmarital first birth vs. a marital first birth (RRR = 0.78). Of the reproductive knowledge measures, only birth control confidence is predictive of first births, with greater confidence reducing the likelihood of having no birth relative to a nonmarital birth among women (RRR = 0.90).

– Table 6 here –

As with women, adolescent perceptions of greater life course consequences of early pregnancy increase men's likelihood of having no birth relative to a nonmarital birth (RRR = 1.19); the RRR for the contrast between a marital and nonmarital first is in the same direction but does not reach statistical significance. Similar to first birth intendedness, men's birth control attitudes during adolescence are significant predictors of having a first birth and the marital status of that birth—more favorable attitudes toward birth control reduce the likelihood of having no children and of a nonmarital birth relative to a marital birth (RRR = 0.87 and RRR = 0.80, respectively). For the union context of first births, the effects of reproductive attitudes and knowledge do not differ in any meaningful way across gender.

Finally, the results predicting second births by marital status are shown in Table 7. Unsurprisingly, the marital status of the first birth strongly predicts both the occurrence and marital context of second births. Men and women with a nonmarital first birth are significantly less likely to have a no birth than a nonmarital birth or to have a marital birth (with no significant

differences across gender). Net of these associations, women who, as adolescents, had negative perceptions of the life course consequences of an early pregnancy are more likely to have no birth than a nonmarital birth (RRR = 1.35) and less likely to have a nonmarital than a marital birth (RRR = 0.78), net of first birth marital status. More positive birth control attitudes also increase the risk of having no second birth relative to a nonmarital birth (RRR = 1.15). More accurate female reproductive knowledge as an adolescent is linked to a higher risk that women will have no second birth relative to a nonmarital birth (RRR = 1.22) and a lower risk that women will have a nonmarital birth relative to a marital birth (RRR = 0.82).

– Table 7 here –

For men, negative perceptions of the life course consequences of an early birth are associated with a lower risk of a second birth relative to a marital birth (RRR = 0.85). And, as before, men's adolescent knowledge about female reproductive biology increases the risk of no birth (RRR = 1.16) and of a nonmarital birth (RRR = 1.22) relative to a marital birth. Higher condom knowledge, however, among men is linked to a lower risk of having no birth (RRR = 0.91) or a nonmarital birth (RRR = 0.81) relative to a marital birth.

Looking across gender, negative perceptions of the consequences appear to discourage nonmarital fertility – even for second births – more so for women than men, whereas they are more strongly related to marital births for men. And, as with unintended fertility for second births, more accurate knowledge in adolescence of female reproductive biology decreases the risk of nonmarital fertility but only for women, with seemingly the opposite association for men.

A note on effect sizes

As an alternative specification, we also ran models in which the continuous independent variables were standardized (not shown) to help gauge the magnitude of the significant effects of

adolescent reproductive attitudes and knowledge on fertility in early adulthood. In these models, a change of one standard deviation in a significant reproductive attitude or knowledge measure was associated with a 10-20% change in the risk of a birth in a given month. These were similar effect sizes as for a one standard deviation change in other significant Wave I time-invariant continuous measures, such as family socioeconomic status or aptitude test score. Perhaps unsurprisingly, effect sizes for these fixed characteristics measured in adolescence were smaller (about a quarter to a third of the size) than the effects of time-varying individual demographic and socioeconomic characteristics measured closer in time to the outcome, particularly categorical variables such as age and education, relative to the base categories for those measures. While the magnitude of these effects are fairly modest, that these fixed, subjective concepts measured in adolescence continue to be associated with behaviors many years later – even net of more contemporaneous characteristics – provides further support that the adolescent years are foundational for forming family and childbearing schema.

Discussion

There is a rich literature studying the link between attitudes and knowledge and fertility behavior. Research on attitudes tends to focus on either a limited set of direct attitudes about prospective childbearing and subsequent childbearing among adults (usually within a fairly short timespan) or on adolescent attitudes predicting adolescent fertility (again, within a fairly short timespan). As such, there is a gap in our understanding of the long-term linkages between adolescent attitudes and fertility later in life. Similar, there is considerably less work on the reproductive knowledge precursors of early adult fertility behaviors (at least in industrialized countries), though the links between teens' reproductive knowledge and teen fertility are fairly well-established. Much of the research linking attitudes and knowledge to fertility has examined

whether individuals have children, the timing of childbearing, and, sometimes, the number of children. The context of childbearing—whether births are intended and occur within marriage—has received less attention in psychosocial research, though the socioeconomic and demographic precursors of unintended and nonmarital fertility have been studied extensively. Moreover, across both attitudinal and knowledge research and across research on both teens' and adults' fertility behaviors, nearly all studies have ignored men.

In this paper, we sought to address these oversights by utilizing recent theoretical developments in demography (Johnson-Hanks, Bachrach, Morgan, & Kohler, 2011) to argue that adolescent reproductive attitudes and knowledge independently influence early adult fertility behaviors. We asked two research questions: Do adolescent reproductive attitudes and reproductive knowledge predict the timing, context, and intention status of early adult fertility? If so, do they do so in the same manner for men and women? Our measures of adolescent reproductive attitudes and knowledge were drawn from prior work demonstrating linkages with early adult contraceptive behavior (Guzzo, Hayford, Lang, Wu, Barber, & Kusunoki, 2019), and we analyzed both first and second birth contexts. We ran models separately by gender and tested for significant differences in the effects of our reproductive attitudes and knowledge measures. To facilitate interpretation of the overall implications of our multiple models and contrasts, we provide a summary table of results (Table 8).

– Table 8 here –

First, do adolescent reproductive attitudes and knowledge predict early adult fertility? The answer is a qualified yes. In general, during the transition to adulthood, reproductive attitudes are more strongly related to fertility than reproductive knowledge, indicated by the greater number of "x" marks for attitudinal measures compared to knowledge measures in Table

8. Although we had tentatively expected that attitudinal measures might be more strongly related to marital status than to intendedness, this does not appear to be the case. The indicator of perceived life course consequences of early childbearing is particularly predictive of early adult fertility. This measure likely taps into the notion of schemas as identifying the contexts of childbearing more so than either birth control attitudes or overall feelings toward pregnancy, as it includes indicators of the 'costs' of childbearing under less-than-desirable circumstances (i.e., my family would be embarrassed, I would have to drop out of school, etc.). Compared to our measures of reproductive attitudes, measures of reproductive knowledge were more strongly linked to the context of second births, suggesting that while attitudinal factors may influence the transition to parenthood, knowledge about reproduction and contraception may affect the longer-term ability to enact childbearing preferences. It is striking that these associations are apparent even when controlling for first birth context, which in itself is highly predictive of second birth context.

We had expected that more favorable attitudes toward birth control and less favorable attitudes toward early childbearing would decrease the likelihood of both unintended and nonmarital childbearing in early adulthood. This is true for women's first births and largely true for second births as well – perceiving greater life course consequences of an early birth and having more negative attitudes toward a teen pregnancy as an adolescent reduce the risk of unintended and nonmarital fertility during the transition to adulthood and, especially for nonmarital births, net of the context of first births. For nonmarital fertility, perceiving greater consequences of an early birth in adolescence predict a lower risk of nonmarital first or second birth relative to a marital birth, at least for women. These patterns suggest that fertility schemas held in adolescence are linked to persistent beliefs about which specific contexts are appropriate

for childbearing throughout the life course (such as whether births should occur within committed and stable unions like marriage), not only the belief that births should be planned or deliberately chosen (which would then correspond to whether births should be intended). For birth control attitudes, there is also evidence that more positive attitudes are associated with subsequent fertility, but only for men's first birth contexts (both intendedness and marital status) and, weakly, for women's risk of having a no birth relative to an unintended or nonmarital birth.

Second, do the effects of adolescent attitudes and knowledge on early adult fertility work similarly across gender? We had expected that adolescent attitudes and knowledge might be more influential for women's than men's early adult fertility, but the results are somewhat equivocal. Overall, there are some, but not many, significant differences across men and women in the direction in which the key measures are associated with adult fertility, as indicated by the shading in Table 8, and some of these differences occur primarily when a measure is significant for one gender but non-significant and in the opposite direction for the other gender. Still, it appears that adolescents' negative perceptions of the life course consequences of an early birth more strongly affect women's fertility behaviors than men's behaviors. This finding is consistent with the notion that worries over the consequences of births weigh more heavily among women than men, as women are both socialized more about the risk of becoming pregnant and bear more of the costs of childbearing/rearing. Birth control attitudes are more often relevant for first birth transitions (both intendedness and marital status) among men than women, but the gender difference is only significant for the contrast between an unintended vs. intended first birth. Female reproductive biology knowledge also predicts second birth contexts across contexts differently for men and women, reducing women's risk of unintended and nonmarital higher-parity births but increasing men's risk of such births. Together, this suggests that adolescent boys

who better understood reproductive biology and had more accurate knowledge of, and favorable attitudes to, contraception made different fertility decisions in early adulthood than either their female counterparts or their less knowledgeable and approving male counterparts. Still, even though there are few differences across gender in the direction of effects, adolescent reproductive attitudes seemed to be slightly more predictive of early adult fertility among women than men, as evidenced by the greater number of "x" marks for women than men.

These results suggest that shifts in the context in which adolescents are taught about sex and reproduction could affect trends in unintended and nonmarital fertility. For instance, men who reported more favorable attitudes toward birth control were less likely to have either an unintended or nonmarital first birth; the shift away from comprehensive, non-judgmental sex ed in the U.S. (Santelli et al., 2017) could reverse the declines in unintended fertility that have only recently emerged (Finer & Zolna, 2016). Similarly, if accurate reproductive biology is taught less frequently, both men and women may have difficulty achieving their overall fertility preferences even after they have become parents. Other population-level shifts, such as the rising need for higher levels of education required even for entry-level jobs, will likely further increase the extent to which adolescents fear that early childbearing would be costly both in the short and long term. Though we focused primarily on unintended and nonmarital fertility, the findings here showed that perceiving greater costs as an adolescent reduced the odds of having a birth at all by Wave IV. Given growing concern over declining birth rates in the U.S. and elsewhere, efforts to help teens and young adults view childbearing as less costly or as more manageable are likely needed to stave off further declines in fertility. These efforts may need to incorporate both structural changes, such as subsidized childcare or paid family leave, and changes in the ways people understand and imagine the challenges of raising children.

Limitations

The quality of male fertility data (Joyner et al., 2012) in surveys is always a concern. However, we are somewhat reassured to find that although men reported fewer births than women, conditional on reporting a birth, men and women had similar proportions experiencing unintended and nonmarital fertility. The proportions of respondents without any children at Wave IV in Add Health are comparable to the levels in the NSFG, which is also reassuring. Another general concern is that, like other studies on fertility, we are unable to analyze pregnancies that do not end in live birth due to under-reporting of abortion (Tierney, 2019), and our indicators of knowledge and attitudes do not include individuals' knowledge about or acceptability towards abortion. Similarly, there is sometimes concern about the reliability and accuracy of retrospective reports of birth intendedness (Guzzo & Hayford, 2014), along with more general concerns as to whether standard items and measurement truly capture individuals' often complex feelings about births (Kost & Zolna, 2019; Potter et al., 2014). Further, while we tested for gender differences in how these concepts may link to fertility, it is also possible that these concepts may be differentially associated with fertility outcomes across other dimensions, such as socioeconomic status or sexual behaviors, and that such variation may further interact with gender, producing more complicated interactions that go beyond the current analysis. Relatedly, other work (Guzzo, Hayford, & Lang, 2020) suggests that these measures lack validity for race-ethnic subgroups; they may also lack validity for subgroups along other dimensions, warranting additional investigation before these concepts are interacted with other dimensions of stratification or used to explain group differences.

Our key measures at Wave I, especially the reproductive knowledge measures, were rather limited; for instance, there were no items about knowledge of birth control methods

besides condoms. Finally, our analysis only extends to the late 20s and early 30s, so we are only capturing early adulthood. In this age group, many who will be parents eventually have not yet had any children, and this is likely to be especially true for the most advantaged group. Thus, analyses of fertility among this sample may be biased towards less advantaged individuals, and whether adolescent attitudes and knowledge are related to completed fertility remains unclear.

Conclusion

Consistent with recent developments in demographic theory, our research provides evidence that fertility schemas exist and are predictive of not just having children but the context in which children are born. Further, these schemas can be identified fairly early in the life course. A large body of work studies how adolescent attitudes toward school and work predict future life outcomes (e.g., Mortimer, Staff, & Lee, 2005; Schneider & Stevenson, 1999; Schoon, 2001). Our findings suggest that reproductive attitudes and knowledge may have a similarly long reach. Future research could examine the relationship between and among attitudes and outcomes in different domains (such as union formation or health behaviors) to further elucidate how adolescents understand their future goals and how these goals evolve into outcomes. At the same time, it is worth acknowledging that schemas may not be stable so much as self-reinforcing; that is, the conditions that lead to certain schemas may be persistent over time, and individuals may act in ways that are consistent with their earlier schemas and therefore further solidify certain schemas and behavioral pathways (cf. Johnson-Hanks et al., 2011). More work is needed to analyze how schemas are developed and maintained as well as what circumstances may challenge previously held schemas. Additionally, we encourage more investigation into the factors that influence men's fertility and family behaviors. The results here suggest that men's adolescent attitudes are somewhat less predictive of their behaviors in early adulthood, at least

for childbearing, compared to women, and so more work is needed to understand how men make decisions about childbearing.

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Table 1. Adolescent Reproductive Attitudes and Knowledge Measures in Add Health

Reproductive Attitudes [A]

Negative Feelings toward Pregnancy

Getting pregnant at this time in your life is one of the worst things that could happen to you.

It wouldn't be all that bad if you got pregnant now.

Negative Life Course Consequences

If you got (If R is male, add: someone) pregnant, it would be embarrassing for your family.

If you got pregnant (If R is male, add: someone), it would be embarrassing for you.

If you got pregnant, you would be forced to grow up too fast.

If you got pregnant, you would have to quit school.

Positive Birth Control Attitudes

It {IS/WOULD BE} too hard to get a {GIRL/BOY} to use birth control with you.

Using birth control is morally wrong.

In general, birth control is too much of a hassle to use.

It takes too much planning ahead of time to have birth control on hand when you're going to have sex.

For you, using birth control interferes/would interfere with sexual enjoyment

In general, birth control is too expensive to buy.

Reproductive Knowledge

Female Reproductive Biology Knowledge (true/false) [B]

The most likely time for a woman to get pregnant is right before her period starts. (false)

In general, a woman is most likely to get pregnant if she has sex during her period, as compared with other times of the month. (false)

Condom Knowledge (true/false) [B]

Even if the man pulls out before he ejaculates, even if ejaculation occurs outside of the woman's body, it is still possible for the woman to become pregnant. (true)

When putting on a condom, it is important to have it fit tightly, leaving no space at the tip. (false)

Vaseline can be used with condoms, and they work just as well. (false)

As long as the condom fits over the tip of the penis, it doesn't matter how far down it is unrolled. (false)

Birth Control Confidence [C]

You are quite knowledgeable about the rhythm method of birth control and when it is a "safe" time during the month for a woman to have sex and not get pregnant.

You are quite knowledgeable about how to use a condom correctly.

You are quite knowledgeable about the withdrawal method of birth control.

[A] All items measured on a scale of 1=strongly agree to 5=strongly disagree, with 3=neither agree not disagree. Analytically, items were reverse coded as necessary such that higher responses mean less favorable attitudes toward childbearing and more favorable attitudes toward contraception.

[B] Analytically, items were recoded so that 1 equals the correct answer, and 0 equals the incorrect answer.

[C] Originally measured on a scale of 1=strongly agree to 5=strongly disagree. Recoded as a dichotomous variable: 1=strongly agree/agree and 0=all other responses.

Table 2. Weighted Unintended and Nonmarital 1st and 2nd Births in Add Health, by Gender

	1st births			2nd births (of those with at least one birth)		
	Women	Men		Women	Men	
Birth intendedness						
No birth	42.2%	57.1%	***	41.0%	49.2%	***
Intended birth	33.4%	26.0%		39.8%	35.5%	
Unintended birth	24.4%	17.0%		19.1%	15.2%	
Birth marital status						
No birth	42.2%	57.1%	***	41.0%	49.2%	***
Marital birth	28.5%	21.7%		36.9%	33.8%	
Nonmarital birth	29.3%	21.3%		22.1%	17.0%	
N	4,996	4,435		2,826	1,859	

*p < 0.05, **p < 0.01, ***p < 0.001 Significant differences between men and women in the distribution from Pearson chi-square tests. May not total 100% due to rounding.

Table 3. Weighted Distributions or Means (Standard Deviations) by Gender

	Women		Men		
Adolescent attitudes & knowledge					
Reproductive attitudes (range 1-5)					
Negative feelings toward pregnancy	4.36	(0.84)	4.36	(0.77)	
Negative life course consequences	3.51	(0.91)	3.40	(0.86)	***
Positive birth control attitudes	4.09	(0.79)	3.86	(0.77)	***
Reproductive knowledge					
Female reproductive biology knowledge (range 0-2)[A]	1.00	(0.78)	0.96	(0.73)	
Condom knowledge (range 0-4)[A]	2.88	(1.12)	2.79	(1.04)	*
Birth control confidence (range 0-3)[B]	1.98	(1.12)	2.15	(0.91)	***
Wave I characteristics					
Race-ethnicity					
Non-Hispanic White	68.6%		68.9%		
Non-Hispanic Black	15.6%		14.2%		
Hispanic	11.3%		11.3%		
Asian/other	4.4%		5.6%		
Foreign-born	6.3%		6.5%		
Family structure					
Both bio parents	56.4%		56.1%		
Stepfamily	15.5%		16.3%		
Single parent	22.6%		21.8%		
Other	5.5%		5.8%		
Family SES (range 1-10)	5.51	(2.78)	5.60	(2.53)	
Ever had sex	45.9%		43.4%		
Discussed pregnancy or AIDS at school	91.5%		88.2%		***
Religiosity (1-4 scale)	3.55	(1.61)	3.53	(1.62)	
Highly wanted & expected to attend college	56.3%		43.9%		***
Aptitude test	100.54	(15.10)	101.85	(13.26)	**
Locus of control (1-5 scale)	3.66	(0.49)	3.70	(0.47)	
Wave IV characteristics					
Age	29.7	(1.22)	29.9	(.1.20)	***
Education					***
Less than high school	5.1%		7.4%		
High school/GED	47.8%		56.3%		
Associate's degree	9.8%		6.9%		
Bachelor's degree or higher	37.3%		29.4%		
N	4,996		4,435		

*p < 0.05, **p < 0.01, ***p < 0.001 Significant differences across gender in distribution or mean

[A] Number of correct responses

[B] Number strongly agree/agree is knowledgeable

Table 4. Relative Risk Ratios from Multinomial Logistic Discrete Time Event History Models Predicting 1st Birth Intendedness, by Gender

	Women			Men		
	No birth v. unintended	No birth v. intended	Unintended v. intended	No birth vs. unintended	No birth v. intended	Unintended v. intended
Reproductive attitudes						
Negative feelings toward pregnancy	1.11	1.22 ***	1.10	0.94	1.09	1.16
Negative life course consequences	1.27 ***	1.05	0.82 **	1.10	1.13 *	1.03
Positive birth control attitudes	1.01	0.99	0.98	1.12	0.88 *	0.78 **
Reproductive knowledge						
Female reproductive biology knowledge	1.05	0.96	0.92	1.01	0.98	0.97
Condom knowledge	1.04	1.02	0.98	1.02	1.02	1.01
Birth control confidence	0.91 *	0.95	1.04	0.92	0.97	1.06
Person-months		551,067			570,600	

Note: Models control for race-ethnicity, nativity, WI family structure, WI family socioeconomic status, WI ever sex, WI sex ed, WI religiosity, WI college aspirations & expectations, WI aptitude, WI locus of control, time-varying age, time varying education, and months of duration

*p < 0.05, **p < 0.01, ***p < 0.001

Shading indicates significant differences in coefficients at *p <0.05 across gender from Wald chi-square tests.

Table 5. Relative Risk Ratios from Multinomial Logistic Discrete Time Event History Models Predicting 2nd Birth Intendedness Among Those with at Least One birth, by Gender

	Women			Men		
	No birth v. unintended	No birth v. intended	Unintended v. intended	No birth vs. unintended	No birth v. intended	Unintended v. intended
Reproductive attitudes						
Negative feelings toward pregnancy	1.00	1.05	1.05	1.15	0.96	0.84
Negative life course consequences	1.17	1.11	0.95	0.92	0.92	1.00
Positive birth control attitudes	1.16 *	1.03	0.89	1.12	1.08	0.97
Reproductive knowledge						
Female reproductive biology knowledge	1.24 *	1.00	0.81 *	0.87	1.17 *	1.34 *
Condom knowledge	0.93	1.06	1.13	1.07	0.92	0.86
Birth control confidence	1.14	1.04	0.91	1.01	0.94	0.94
Unintended 1st birth	0.60 ***	1.57 ***	2.60 ***	0.66 ***	2.05 ***	3.12 ***
N		134,693			77,460	

Note: Models control for race-ethnicity, nativity, WI family structure, WI family socioeconomic status, WI ever sex, WI sex ed, WI religiosity, WI college aspirations & expectations, WI aptitude, WI locus of control, time-varying age, time varying education, and months since last birth.

*p < 0.05, **p < 0.01, ***p < 0.001

Shading indicates significant differences in coefficients at *p < 0.05 across gender from Wald tests.

Table 6. Relative Risk Ratios from Multinomial Logistic Discrete Time Event History Models Predicting 1st Birth Marital Status, by Gender

	Women			Men		
	No birth v. nonmarital	No birth v. marital	Nonmarital v. marital	No birth v. nonmarital	No birth v. marital	Nonmarital v. marital
Reproductive attitudes						
Negative feelings toward pregnancy	1.14 **	1.20 ***	1.05	1.01	1.05	1.04
Negative life course consequences	1.28 ***	0.99	0.78 ***	1.19 **	1.06	0.89
Positive birth control attitudes	1.04	0.95	0.92	1.09	0.87 *	0.80 **
Reproductive knowledge						
Female reproductive biology knowledge	0.98	1.02	1.04	1.01	0.98	0.97
Condom knowledge	0.99	1.07	1.08	1.07	0.96	0.90
Birth control confidence	0.90 *	0.96	1.07	0.94	0.96	1.04
Person-months		551,067			570,600	

Note: Models control for race-ethnicity, nativity, WI family structure, WI family socioeconomic status, WI ever sex, WI sex ed, WI religiosity, WI college aspirations & expectations, WI aptitude, WI locus of control, time-varying age, time varying education, and months of duration

*p < 0.05, **p < 0.01, ***p < 0.001

Shading indicates significant differences in coefficients at *p < 0.05 across gender from Wald chi-square tests.

Table 7. Relative Risk Ratios from Multinomial Logistic Discrete Time Event History Models Predicting 2nd Birth Marital Status Among Those with at Least One birth, by Gender

	Women			Men		
	No birth v. nonmarital birth	No birth v. marital birth	Nonmarital vs. marital birth	No birth v. nonmarital birth	No birth v. marital birth	Nonmarital vs. marital birth
Reproductive attitudes						
Negative feelings toward pregnancy	1.06	1.01	0.95	1.13	0.99	0.88
Negative life course consequences	1.35 ***	1.04	0.78 **	1.03	0.85 *	0.83
Positive birth control attitudes	1.15 *	1.02	0.88	1.07	1.05	0.98
Reproductive knowledge						
Female reproductive biology knowledge	1.22 **	1.00	0.82 *	0.95	1.16 *	1.22 *
Condom knowledge	1.06	0.98	0.92	1.12	0.91 *	0.81 *
Birth control confidence	1.05	1.07	1.02	1.00	0.93	0.92
Nonmarital 1st birth	0.21 ***	3.17 ***	14.96 ***	0.19 ***	2.41 ***	12.87 ***
N	134,693			77,758		

Note: Models control for race-ethnicity, nativity, WI family structure, WI family socioeconomic status, WI ever sex, WI sex ed, WI religiosity, WI college aspirations & expectations, WI aptitude, WI locus of control, time-varying age, time varying education, and months since last birth.

*p < 0.05, **p < 0.01, ***p < 0.001

Shading indicates significant differences in coefficients at *p < 0.05 across gender from Wald tests.

Table 8. Summary Table of Results of Models using Wave I Reproductive Attitudes and Knowledge to Predict Fertility, by Gender

	Intendedness				Marital Status			
	Women: 1st births	Men: 1st births	Women: 2nd births	Men: 2nd births	Women: 1st births	Men: 1st births	Women: 2nd births	Men: 2nd births
Reproductive attitudes								
Negative feelings toward pregnancy	x				xx			
Negative life course consequences	xx	x			xx	x	xx	x
Positive birth control attitudes		xx	x			xx	x	
Reproductive knowledge								
Female reproductive biology knowledge			xx	xx			xx	xx
Condom knowledge								xx
Birth control confidence	x				x			

Key: An "x" indicates that the particular measure significantly predicts at least one of the contrasts for each outcome (all have three contrasts because the dependent variable has three categories), and shading indicates significant differences between men and women for at least one contrast. The number of "x" marks indicates the number of contrasts for which that measure is significant.

Appendix A. Relative Risk Ratios for Covariates from Multinomial Logistic Discrete Time Event History Models Predicting 1st Birth Intendedness, by Gender

	Women			Men		
	No birth v. unintended	No birth v. intended	Unintended v. intended	No birth vs. unintended	No birth v. intended	Unintended v. intended
Race-ethnicity						
Non-Hispanic White	--	--	--	--	--	--
Non-Hispanic Black	0.83	1.82 ***	2.20 ***	0.67 **	1.23	1.84 **
Hispanic	0.96	1.30	1.35	1.03	1.08	1.05
Asian/other	1.01	1.30	1.29	1.35	1.95 **	1.44
Foreign-born	0.88	1.13	1.28	1.31	1.04	0.79
Age (time-varying)						
15-19	1.10	1.84 ***	1.67 *	1.34	2.07 **	1.55
20-24	--	--	--	--	--	--
25-29	2.17 ***	0.92	0.42 ***	1.65 *	1.07	0.65
30 or older	8.10 ***	0.90	0.11 ***	3.54 **	1.74	0.49
WI family structure						
Both biological parents	--	--	--	--	--	--
Stepfamily	0.64 ***	0.91	1.43 *	0.99	0.91	0.92
Single mom/dad	0.72 **	1.01	1.40 *	1.11 ***	1.19	1.07
Other	0.67 *	0.83	1.24	0.88	0.88	1.01
WI family socioeconomic status	1.09 ***	1.06 ***	0.97	1.07	1.03	0.97
W1 sex	0.66 ***	0.73 **	1.11	0.54	0.67 ***	1.23
WI discussed pregnancy or AIDS at school	0.74	0.88	1.19	1.04	0.97	0.93
WI religiosity	1.04	0.98	0.94 *	1.02	1.01	0.99
WI highly wanted & expected to attend college	1.19	1.00	0.83	1.26	1.23 *	0.98 **
WI PPVT	1.00	1.01 ***	1.01 ***	0.99	1.01 **	1.02
WI locus of control	0.97	0.97	0.99	0.92	0.84 *	0.91
Education (time-varying)						
Less than high school	0.95	1.09	1.15	1.15	0.96	0.83
High school	--	--	--	--	--	--
Associate's degree	1.06	1.02	0.96	1.20	0.77	0.63
Bachelor's degree or higher	1.99 ***	1.10	0.55 ***	1.53 *	0.93	0.60 *
Duration in months (time-varying)	0.99 **	0.99 ***	1.00	0.99 *	0.99 **	0.99
Constant	167.39 ***	63.29 ***	0.38	1259.86 ***	651.47 **	0.58
Persons		4,996			4,435	
Person-months		551,067			570,600	

*p < 0.05, **p < 0.01, ***p < 0.001

Appendix B. Relative Risk Ratios for Covariates from Multinomial Logistic Discrete Time Event History Models Predicting 2nd Birth Intendedness, by Gender

	Women			Men		
	No birth v. unintended	No birth v. intended	Unintended v. intended	No birth vs. unintended	No birth v. intended	Unintended v. intended
Race-ethnicity						
Non-Hispanic White	--	--	--	--	--	--
Non-Hispanic Black	0.80	1.56 ***	1.95 ***	0.86	1.19	1.39
Hispanic	1.47	1.16	0.79	0.65 *	1.21	1.86 *
Asian/other	1.22	0.84	0.69	0.67	2.42 **	3.62
Foreign-born	0.72	0.87	1.21	0.87	0.62 ***	0.71
Age (time-varying)						
15-19	1.29	2.00 **	1.55	3.09 *	1.18	0.38
20-24	--	--	--	--	--	--
25-29	1.55 **	1.09	0.70	1.61 **	0.88	0.54
30 or older	2.00	1.97 **	0.99	3.10 *	1.57	0.51
WI family structure						
Both biological parents	--	--	--	--	--	--
Stepfamily	1.03	1.07	1.04	0.88	1.17	1.33
Single mom/dad	1.07	1.06	0.99	0.77	1.11	1.43
Other	0.64 *	1.08	1.70	0.81	1.60	1.97
WI family socioeconomic status	1.00	1.0	0.99	1.05	1.02	0.97
W1 sex	1.05	1.11	1.06	0.89	1.01	1.14
WI discussed pregnancy or AIDS at school	1.25	0.89	0.71	1.20	0.91	0.76
WI religiosity	1.00	1.01	1.01	0.98	0.94	0.96
WI highly wanted & expected to attend college	1.41 *	0.93	0.66 *	0.78	1.07	1.37
WI PPVT	1.00	1.00	1.00	1.00	1.00	1.00
WI locus of control	1.01	0.90	0.89	1.34	0.87	0.65
Education (time-varying)						
Less than high school	0.93	0.99	1.06	0.86	1.11	1.29
High school	--	--	--	--	--	--
Associate's degree	1.42	1.15	0.81	1.20	1.20	1.00
Bachelor's degree or higher	0.67	0.75 *	1.13	1.13	0.66 *	0.58
Duration in months (time-varying)	0.99 *	0.99 ***	0.99 *	1.00	0.99 ***	0.99 *
Constant	69.94 ***	103.68 ***	1.48	57.11 ***	516.61 ***	9.05
Persons		2,826			1,859	
Person-months		134,693			77,460	

*p < 0.05, **p < 0.01, ***p < 0.001

Appendix C. Relative Risk Ratios for Covariates from Multinomial Logistic Discrete Time Event History Models Predicting 1st Birth Marital Status, by Gender

	Women			Men		
	No birth v. nonmarital	No birth v. marital	Nonmarital v. marital	No birth v. nonmarital	No birth v. marital	Nonmarital v. marital
Race-ethnicity						
Non-Hispanic White	--	--	--	--	--	--
Non-Hispanic Black	0.74 *	3.82 ***	5.19 ***	0.59 ***	2.17 ***	3.71 ***
Hispanic	0.89	1.44	1.61	0.81	1.38 *	1.70 **
Asian/other	1.12	1.29	1.16	1.53	1.88 *	1.23
Foreign-born	1.23	0.83	0.68 *	1.15	1.08	0.94
Age (time-varying)						
15-19	1.13	2.11 ***	1.86 ***	1.27	2.96 ***	2.34 **
20-24	--	--	--	--	--	--
25-29	2.11 ***	0.85	0.40 ***	2.13 ***	0.79	0.37 ***
30 or older	4.38 ***	0.81	0.18 ***	4.77 ***	1.20	0.25 ***
WI family structure						
Both biological parents	--	--	--	--	--	--
Stepfamily	0.58 ***	1.05	1.80 ***	0.92	0.95	1.03
Single mom/dad	0.70 **	1.12	1.60 **	1.03	1.31 *	1.28
Other	0.61 **	1.01	1.66 *	0.74	1.09	1.47
WI family socioeconomic status	1.07 ***	1.07 ***	1.00	1.05 *	1.05 *	0.99
W1 sex	0.61 ***	0.78 *	1.27 *	0.49 ***	0.75 **	1.54 **
WI discussed pregnancy or AIDS at school	0.83	0.82	0.99	1.01	0.99	0.98
WI religiosity	1.00	1.01	1.02	1.01	1.01	1.00
WI highly wanted & expected to attend college	1.19	0.97	0.82	1.27 *	1.22 *	0.96
WI PPVT	1.01	1.01	1.00	1.00	1.01	1.01
WI locus of control	0.97	0.98	1.02	0.95	0.80 *	0.84
Education (time-varying)						
Less than high school	0.87	1.42 *	1.63 **	0.87	1.40 *	1.61 *
High school	--	--	--	--	--	--
Associate's degree	1.49	0.90	0.60 *	1.14	0.80	0.70
Bachelor's degree or higher	2.88 ***	1.04	0.36 **	2.00 ***	0.91	0.46 ***
Duration in months (time-varying)	0.99 **	0.99 ***	1.00	0.99 ***	0.99 ***	1.00
Constant	83.67 ***	131.16 ***	1.57	575.95 ***	1386.30 ***	2.41
Persons		4,996			4,435	
Person-months		551,067			570,600	

*p < 0.05, **p < 0.01, ***p < 0.001

Appendix D. Relative Risk Ratios for Covariates from Multinomial Logistic Discrete Time Event History Models Predicting 2nd Birth Marital Status, by Gender

	Women			Men		
	No birth v. nonmarital	No birth v. marital	Nonmarital v. marital	No birth v. nonmarital	No birth v. marital	Nonmarital v. marital
Race-ethnicity						
Non-Hispanic White	--	--	--	--	--	--
Non-Hispanic Black	0.81	1.63 **	2.00 **	0.72	1.49 *	2.07 **
Hispanic	1.04	1.27	1.23	0.79	1.02	1.30
Asian/other	1.11	0.84	0.76	1.06	1.96	1.85
Foreign-born	0.96	0.78	0.81	1.03	0.60 **	0.58
Age (time-varying)						
15-19	1.32	2.33 *	1.77	1.48	3.96	2.67
20-24	--	--	--	--	--	--
25-29	1.70 ***	1.14	0.67 *	1.26	0.95	0.76
30 or older	4.72 **	1.87 *	0.40	2.12	1.76	0.83
WI family structure						
Both biological parents	--	--	--	--	--	--
Stepfamily	0.97	1.04	1.07	1.19	0.99	0.83
Single mom/dad	0.91	1.13	1.24	0.96	1.04	1.09
Other	0.61 *	1.17	1.93 *	1.05	1.30	1.24
WI family socioeconomic status	1.07 *	0.96 **	0.89 ***	1.06	1.02	0.96
W1 sex	1.10	1.04	0.94	0.86	1.05	1.22
WI discussed pregnancy or AIDS at school	0.89	1.09	1.22	0.86	1.12	1.31
WI religiosity	1.03	0.98	0.96	0.97	0.95	0.98
WI highly wanted & expected to attend college	1.11	1.07	0.96	1.07	0.95	0.89
WI PPVT	1.00	1.00	1.00	1.00	1.00	1.00
WI locus of control	0.88	0.96	1.10	0.97	0.98	1.01
Education (time-varying)						
Less than high school	0.78	1.23	1.58 *	0.66 *	1.46 *	2.21 **
High school	--	--	--	--	--	--
Associate's degree	1.61	1.17	0.73	6.36 ***	0.91	0.14 **
Bachelor's degree or higher	2.34 *	0.71 ***	0.30 **	3.30	0.65 **	0.20 *
Duration in months (time-varying)	0.99 ***	0.99 ***	1.00	1.00	0.99 ***	0.99 *
Constant	132.34 ***	97.55 ***	0.74	586.14 ***	319.50 ***	0.55
Persons		2,826			1,859	
Person-months		134,693			77,460	

*p < 0.05, **p < 0.01, ***p < 0.001