HHS Public Access

Author manuscript

J Marriage Fam. Author manuscript; available in PMC 2018 August 01.

Published in final edited form as:

J Marriage Fam. 2017 August ; 79(4): 1076–1095. doi:10.1111/jomf.12403.

Disentangling Perceived Norms: Predictors of Unintended Pregnancy During the Transition to Adulthood

Ellen L. Compernolle

University of Michigan

Abstract

Using data from the Relationship Dynamics and Social Life Study, this study examines the role of perceived norms in predicting unintended pregnancy among young women ages 18–22. First, it compares the relative influence of the *content* – injunctive (approval) versus descriptive (prevalence) – and *referent* – parents' versus friends' - of fertility-related norms. Second, in identifying entrance into motherhood as an important life course event, particularly during the transition to adulthood, it explores how these influences vary by parity. Third, it tests two potential mechanisms: conformity via internalization and superficial conformity. Findings support injunctive norms: non-mothers' risk of unintended pregnancy is largely influenced by friends' approval, whereas parents' approval best predicts that of young mothers'. The effects are independent of respondents' own attitudes, suggesting superficial conformity. The study sheds light on how young women's perceptions of what is "normal" among important others influence a consequential early-life event: becoming a parent.

Keywords

Pregnancy; Life course; Social psychology

INTRODUCTION

Unintended pregnancy – those that are mistimed and/or unwanted (Santelli et al., 2003) - in the US remains a national health concern. Pregnancy rates among teenagers and young women increased from the early 1970s to the early 1990s by roughly 21 percent and 17 percent, respectively (Kost & Henshaw 2010). While the teen and overall birthrate has since declined (Ventura, Hamilton & Matthews 2014), the US teenage pregnancy rate remains among the highest of all industrialized nations (Singh & Darroch 2000), with recent estimates of 22.3 live births per 1,000 females aged 15–19 (Hamilton et al., 2016). And global comparisons find that North America is the only region in which overall and unintended pregnancy rates have not declined since 1995 (Singh, Sedgh & Hussain 2010). Unintended pregnancy rates vary largely by socio-demographic characteristics, with rates above average for women who are unmarried, have low incomes, are racial/ethnic

Direct correspondence to: Ellen L. Compernolle by email at ecomper@umich.edu, by phone at 734-763-4589, by post at Department of Sociology, Literature Sciences and the Arts Building, Rm #3001, 500 S. State Street Ann Arbor, MI 48109-1382, or by fax at 734-763-6887.

minorities, and have not completed high school. The highest rates of unintended pregnancy in the US are for women ages 18–24 (Finer & Zolna 2014).

Although researchers agree that most of the consequences of unintended pregnancy are due to selection (e.g. Ashcraft, Fernandez-Val, & Lang 2013; Furstenberg 2003; Kost & Lindberg 2015), the event is associated with an array of serious consequences for both mothers and children (Gipson, Koenig & Hindin 2008). Women who experience an unintended pregnancy are at greater risk of physical abuse and violence than women whose pregnancies are reported as intended (Gazamararian et al., 2005; Lau 2005). They also tend to receive less preconception and delayed prenatal care (Brown & Eisenberg 1995), experience higher rates of post-partum depression (Lau & Keung 2007), and be at greater risk of preterm delivery and low birth weights (Eggleston, Tsui & Kotelchuck 2001). Additionally, children born from an unintended pregnancy often have poorer physical and mental health (Crissey 2006), lower cognitive test scores (Baydar 1995), and higher levels of delinquency during adolescence (Hay & Evans 2006) than those born from an intended pregnancy.

Researchers highlight the importance of perceived norms in explaining behaviors, including those related to fertility (Liefbroer & Billari 2010; Mollborn 2007, 2010; Mollborn, Domingue & Boardman 2014). Studies often situate norms into the theory of planned behavior (TPB) framework proposed by Fishbein & Ajzen (2011) (Ajzen 1991). The framework posits that perceived norms – an individual's perceptions of important others' attitudes (*injunctive norms*) and behaviors (*descriptive norms*) - associated with a behavior, along with an individual's attitudes toward and perceived control over the behavior, act together to influence behavioral intentions, which in turn determine the probability of following through with the behavior. Despite its focus on intended behaviors, the TPB lends well to the study of unintended young pregnancy for two reasons. One, young adulthood is characterized by its highly uncertain nature and frequency of transitions. So consideration of young women's dynamic and often-changing social environment is key to understanding their fertility. Two, as recent research emphasizes the complexity of intentions and reasoned action in the 'heat of the moment' (e.g. Barber 2011; Gibbons et al., 1995), these same social factors are likely to help explain the high rate of young women's pregnancies that are unintended as well.

Two salient social actors on whom young adults draw normative ideas to inform their decisions when faced with these uncertainties are parents and friends (Udry 1993). Regarding fertility, evidence suggests that parents' preferences and behaviors regarding family formation influence their children's related attitudes and behaviors (e.g., Barber 2001; Steenhof & Liefbroer 2008). However, parental influences tend to weaken as children age into adulthood due to new socialization forces, notably peer networks. Teenagers tend to conform to the family formation behaviors of their friends by learning about contraceptives and how to obtain them (Mollborn et al., 2014; Montgomery & Casterline 1996) – effects likely to persist into the late teens and early 20s - while also remaining influenced by deeply ingrained parental beliefs.

Both parents and friends are predicted to influence young women's pregnancy-related attitudes and behaviors, although the contents, sources, and transmission mechanisms of perceived norms that best predict unintended pregnancy remain unclear. Specifically, little is known about whether these norms operate through young women's own pregnancy attitudes (conformity via internalization) or independent of them (superficial conformity) or, importantly, whether young motherhood itself alters these social influences.

This study examines how perceived norms regarding pregnancy-related attitudes and behaviors influence non-marital unintended pregnancy among young women ages 18–22 during the transition to adulthood. It utilizes highly detailed data from the Relationship Dynamics and Social Life Study (RDSL) (collected 2008–2012 in Genesee County, Michigan; http://www.icpsr.umich.edu/icpsrweb/DSDR/studies/34626). The sample captures women found to have the highest risk of unintended pregnancy in the US – those unmarried and in their late teens/early 20s - and is representative of Michigan, a state with fertility patterns that match the median in the US as a whole. The data are uniquely designed for this investigation, as women report weekly on their pregnancy status and intentions, and report every three months on their perceptions of friends' and parents' pregnancy-related attitudes and behaviors, as well as their own attitudes toward the same behaviors. The study makes three important contributions to the literature. First, it compares for predictive power the *content* – injunctive (approval) versus descriptive (prevalence) – and the *referents* – parents versus friends - of perceived norms (Question 1). Second, it analyzes how these effects vary by parity, shedding light on how salient social influences differ based on a young woman's motherhood status (Question 2). Third, by including respondents' own pregnancy-related attitudes in predictive models, it accounts for *how* social norms may operate to affect unintended young pregnancy – conformity via internalization and/or superficial conformity (Question 3).

THEORETICAL FRAMEWORK

Below, I discuss the role perceived norms play in explaining behaviors, paying particular attention to their content and referents. Next, I consider unintended pregnancy within a life course perspective, identifying young adulthood as a distinct period and recognizing entrance into motherhood as a meaningful marker of a life course transition within this stage. I then discuss mechanisms through which perceived norms are predicted to affect the risk of pregnancy. Finally, I present three key research questions on the relationship between norms and unintended pregnancy based on gaps in the literature, and move to test these questions empirically.

Early social psychological models of behavior consisted of attitudes predicting behaviors. In response to weak support for them, Fishbein and Ajzen (Ajzen 1991; Ajzen & Fishbein 1980, 2011) proposed a more complex explanation. The theory of planned behavior (TPB) posits that in any behavioral domain, such as fertility, three constructs shape individuals' intentions, which then determine the probability of their performing the behavior: their attitudes toward the focal behavior, the perceived norms they hold in relation to the behavior, and their perceived ability to execute the behavior. Perceived norms take into account an individual's social environment, capturing how perceptions of what is expected or desired

from significant others help predict behaviors. The predictive power of perceived norms varies based on their content and referent.

Perceived Norms (Question 1)

Content: Injunctive and Descriptive—First, norms can be disentangled by content: 1) perceptions of what other important individuals or groups think about a particular behavior (*injunctive norms*: perceived approval), and 2) perceptions of whether important others do or do not perform a particular behavior (*descriptive norms*: perceived prevalence) (Ajzen & Fishbein 1980, 2011). It is first important to note that pregnancy is not an isolated event, but rather is tightly linked to other specific behaviors occurring either prior or subsequent to it. Sex and contraception are two proximate determinants resulting in a pregnancy, while having a baby is an obvious outcome resulting from the pregnancy itself. As such, norms regarding these behaviors – having sex, using birth control, and having a baby – capture the larger behavioral context in which pregnancy is embedded (Mollborn & Sennott 2015). So regarding pregnancy, an individual's perceived norms are informed by how salient others both seem to think about these related behaviors, as well as whether they seem to be performing them themselves. Of course, the relative importance of norms regarding specific behaviors is expected to differ across contexts. When it comes to young women, for example, more perceived support for pronatal behaviors (i.e., being sexually active and having a baby) might be more important than support for behaviors that protect against pregnancy (i.e., using birth control): the former may increase the likelihood of sexual activity, whereas the latter may not necessarily translate into contraceptive use. The same goes for perceived approval versus perceived prevalence for a behavior: a woman's belief that friends approve of her having sex may be less influential on her own behaviors than her recognition that her friends do not, in actuality, have sex.

Referents: Parents (and Other Adults) and Friends—Second, the degree to which an individual is influenced by perceptions of others' attitudes and behaviors depends on the degree to which she feels motivated to comply with the particular social agent. So, a person who perceives that others with high referent power, such as parents or close friends, hold positive views on a behavior is more likely than a counterpart to intend to perform that behavior. Little research has tested either the relative or combined effects of parents' (and other adults') and friends' perceived norms on the fertility behaviors of young women ages 18–22, although research on their separate effects indicates that both have influence.

Scholars have long researched parental influences on children's fertility. Parents' family size has been documented to be positively associated with that of their children (Duncan et al., 1965). Other parental structural characteristics and behaviors, including divorce, income and financial stability, education, and labor force participation (Amato & Kane 2011; Fine & Fincham 2013; Trent & South 1992), have been found to influence children's familial decisions as well. Research indicates an ideational component to intergenerational transmission of family size too: children's perceptions of parental preferences, separate from parents' behaviors, positively influence children's expectations (Axinn et al., 1994; Jennings, Axinn, & Ghimire 2012), as do the parental values, beliefs, and attitudes themselves (Barber 2000).

In addition to parents, other adults may influence young women's fertility, either by directly supporting similar behaviors or by serving as role models of normative behavior (Hogan & Kitagawa 1985). For example, a young woman's perception that single motherhood is common among adults in her community may shape her expectations and intentions for the experience of childbearing. Such behavior among adult women in close proximity can be particularly powerful given that young women are rarely familiar with the details of their parents' fertility behaviors. Rather, perceived prevalence of community patterns can serve as a proxy for normative acceptable "adult" behavior.

Peers' behaviors and attitudes have also been documented to affect individuals' fertility. Perceived prevalence of sexual behaviors among peers has been found to influence early sexual initiation (Kinsman et al., 1998), sexual activity, condom use (Romer et al., 1994), and teen pregnancy (Yakusheva & Fletcher 2015). Scholars have also found that young people's beliefs regarding their peers' views on the riskiness and acceptability of sex affects their rates of oral sex (Halpern-Felsher et al., 2005) and age at first intercourse (Baumer & South 2001), whereas perceptions of unfavorable peer attitudes toward intercourse have been linked to intentions to remain sexually abstinent (Watts & Nagy 2000) and to delay sexual initiation (see Buhi & Goodson 2007 for review). Additionally, group attitudes are important predictors of young people's pregnancy, intercourse, and contraceptive usage (Mollborn et al., 2014; Sennott & Mollborn 2011). These studies show a clear association between peers and sexual behaviors among high school teenagers - effects likely to persist into individuals' late teens and early 20s.

Life Course: Social Influences and the Transition to Motherhood in Young Adulthood (Question 2)

Theory clearly predicts both parents (and other adults) and friends to be influential social actors on individuals' pregnancy risks. These effects, however, are expected to vary based on when in the life course they occur. The life course perspective acknowledges the importance of the timing, duration, and sequencing of exposures over the lifetime (Elder Jr et al., 2003). Exposure to particular social structures and actors at specific life stages – early childhood, for example – is expected to influence attitudes and behaviors not only at that point, but in the future as well (Elder 1977). While parents have served as important sources of influence since childhood (Barber 2000), and continue to influence children's values well into adulthood, peers tend to serve as critical models of normative behavior during adolescence and young adulthood (Montgomery & Casterline 1996) – a period in which individuals are "highly susceptible to attitude change" (Krosnick & Alwin 1989). Further, as young adults in the US currently value independence and individual exploration, young women may elect to act in accordance with their perceptions of what is normatively acceptable among their friends, rather than their parents, as a way to find their own identity, fit in with their peers, or even rebel.

Among young women, another important consideration is how motherhood itself might affect normative influences on pregnancy-related behaviors. Becoming a mother is a significant life event marked by age norms that signals a transition in social roles and activities (Elder 1975; Huinink & Kohli 2014). Young motherhood may alter social

interactions as various network members respond in supportive or sanctioning ways to this transition. The locus of influence for new young mothers may shift from peers to parents as they seek experienced support for their new role (Unger & Wandersman 1985). Motherhood may also induce a change in pregnancy attitudes among young women that in turn affects their pregnancy-related behaviors, a trend long observed for similar attitude-behavior pairings in research on divorce, cohabitation, and childbearing (Axinn & Thornton 1993; Morgan & Waite 1987; Waite et al., 1986).

Mechanisms: How Do Perceived Norms Influence Pregnancy? (Question 3)

How exactly perceived norms affect young women's risk of unintended pregnancy has not been established, although existing evidence supports two mechanisms. These operate either by affecting young women's own pregnancy-related attitudes (conformity via internalization) or by influencing their behavior independent of them (superficial conformity).

Conformity Via Internalization—One way that social actors influence behavioral outcomes is by sharing information, attitudes, and beliefs about behaviors (Montgomery & Casterline 1996). Parents are often main actors: their attitudes and related behaviors are well known to be related to those of their children, and this continues well into adulthood (Alwin et al., 1991). These influences have been attributed to children's early life exposure (Chodorow 1978) or tacit parental support of the particular behavior (e.g., Axinn & Thornton 1993), but parents also shape how their children *want* to behave by affecting their own attitudes and preferences (Barber 2000). Still, as girls reach adolescence and young adulthood, they commonly consult with their peers on sexual behaviors and contraception options, and develop attitudes based on these interactions (Mollborn et al., 2014; Montgomery & Casterline 1996). So, young women behave in accordance to their own pregnancy-related attitudes, which develop throughout their lives, and are shaped by norms embodied by important others (Blumer 1986; Mead 2009).

Superficial Conformity—With superficial conformity, a young woman also behaves in accordance with what she perceives are normative attitudes and behaviors, although these do not necessarily align with her own attitudes. For example, children may behave in ways they believe will please their parents (Barber 2000), in part due to the authority and power inherent in their social relationship (Montgomery & Casterline 1996). Similarly, studies document peers' influence - independent of individuals' own attitudes - on behaviors, particularly in adolescence and young adulthood: teenagers have a higher risk of self-reported misconduct (Brown, Clasen, & Eicher 1986) and both adolescents and young adults are more likely to make risky decisions (Gardner & Steinberg 2005) when in the presence of others. Such peer influences on behavior has been variously attributed to peer pressure (a desire to avoid conflict or sanction) or socio-emotional factors driven by investment in their peers (Steinberg 2008).

Research Questions

The theoretical framework discussed above highlights important gaps in the literature and leads to key research questions regarding how perceived norms influence the risk of non-

marital unintended pregnancy among young women ages 18–22 during the transition to adulthood.

Question 1 (norms: content and referent): What is the relative influence of parents' (and other adults') and friends' injunctive and descriptive norms on young women's unintended pregnancy?

Question 2 (parity): How do these influences vary based on young women's parity?

Question 3 (mechanism): How do these norms operate to influence young women's unintended pregnancy: conformity via internalization or superficial conformity?

DATA AND METHOD

Sample

I use data from the Relationship Dynamics and Social Life (RDSL) study. Although other studies, such as Add Health, also collect normative measures, this study is uniquely designed for this investigation due to its focus on young women during the transition to adulthood and its highly detailed longitudinal nature. The sample consists of non-married women aged 18–22 - the marital status and age range with the highest risks of unintended pregnancy - residing in a single Michigan county. The county was chosen due to the significant number of African Americans in residence as well as variation in economic circumstances across race. Respondents were sampled using driver's licenses and Personal Identification Cards; the sampling frame reflected Census-based projections for this population (Barber, Kusunoki, & Gatny 2011). Importantly, key reproductive measures for the state of Michigan, such as marriage, non-marital teenage childbearing, and unintended pregnancies, fall around the national median. So the sample is representative of a typical US state (Finer & Kost 2011; Miller, Barber, & Gatny 2013). Descriptive statistics for this sample are discussed in more detail in the Results section below.

The RDSL conducted a baseline interview that assessed characteristics of family background, including demographic information; attitudes, perceived norms, values and beliefs; current and past romantic relationships; and education. After the baseline, respondents were invited to participate in a weekly, mixed-mode (internet and phone) journal-type survey for 130 weeks (2.5 years). Over 90 percent of the 1,003 respondents who completed the baseline interview enrolled in the weekly journal portion of the study (N=922).

This study investigates the effects of perceived norms on women's non-marital unintended pregnancy during the transition to adulthood. As such, the analytic sample is restricted to women who never reported being married at any point during the study. Analyses are further restricted to unintended pregnancies: those occurring in weeks in which respondents reported strong intentions to get pregnant were dropped. This resulted in a working sample of 43,853 person-weeks for analysis of risk of unintended first parity pregnancies (no prior births), with 115 unintended first parity pregnancies reported among 718 women. Among women who have had one prior birth, there were 4,883 person-weeks for analysis of risk of

unintended second parity pregnancies, with 193 women reporting 52 unintended second parity pregnancies.

Measures

Unintended Pregnancy—Pregnancy is measured as the report of a positive pregnancy test, coded 1 for *yes* and 0 for *no*. Respondents were first asked whether it is possible they are pregnant. If the answer is yes, they are asked if a pregnancy test has indicated that they are pregnant. One time-varying measure assesses their pregnancy intent via a question asking how much the respondent wants to get pregnant, with responses coded from 0 to 5, where 0 is *not at all* and 5 is *very much*. To eliminate from analyses any strongly intended pregnancies, respondent-weeks in which pregnancy intention was 5 for *wants to get pregnant* were dropped. Dropping person-weeks in which women report strong intentions to get pregnant leads to estimates of only those pregnancies that are truly unintended. Sensitivity analyses dropping respondent-weeks with weaker intentions of getting pregnant yielded similar results.

Perceived Norms

Injunctive norms (approval): Three separate measures assess respondents' perceptions of parents' and friends' approval of pregnancy-related behaviors via questions asking separately how each group (parents and friends) would react if the respondent had sex, was using birth control, and had a baby, totaling six questions. Responses are coded from 0 to 5, where 0 is *not at all positively* and 5 is *extremely positively*.

Descriptive norms (prevalence): Three measures assess respondents' view on the prevalence of friends' pregnancy-related behaviors via questions asking how many of the respondents' friends have had sex, are using birth control, and are parents. An additional measure assesses the normative behaviors of neighbors via a question asking how many women in the respondents' community are single mothers. Responses are coded from 0 to 5, where 0 is *none* and 5 is *almost all of them*. Although this measure does not capture descriptive norms of parents – measures that are likely difficult to assess among young women - it does assess respondents' perceptions of the commonality of single motherhood in their immediate environment, and particularly the prevalence among adults in close proximity. Perceived norm measures were assessed at baseline and every three months and are included in models individually. The most recently assessed norms are imputed for weeks between quarters.

Mechanisms—Perceived norms are expected to influence unintended pregnancy by affecting young women's own pregnancy-related attitudes (conformity via internalization), or by influencing their behaviors independent of these attitudes (superficial conformity).

Respondents' own attitudes: Three measures assess respondents' attitudes toward sex via questions asking about acceptability of sex before marriage among young people, premarital sex with friends, and appropriate sexual behavior when dating. Likewise, three measures assess respondents' attitudes toward birth control: condom is a sign of mistrust, using birth control is morally wrong, and birth control is an interference with sexual enjoyment. Lastly,

three measures assess respondents' attitudes toward having children: motherhood is a fulfilling experience, older mothers have more health problems, and children cause worry. All nine measures were coded from 0 to 5, where 0 is *strongly disagree* and 5 is *strongly agree*. Attitude statements not supportive of sex/contraception/baby were recoded so that strong agreement (5) indicates more support toward the corresponding behavior. Analyses include three separate attitude scales: respondents' average agreement with attitudes toward sex, toward birth control, and toward birth. Attitude measures were collected at baseline and every three months. Missing norms and attitudes data were replaced with baseline mode values. Missing data for each measure ranged from 0 to 268 person-weeks, averaging 0.07% of the total sample of person-weeks (48,736). Additional models replacing missing data using multiple imputation yielded similar results.

Other Important Factors

Relationship status: Romantic partners' fertility-related attitudes and values have been found to influence women's fertility outcomes (Heavey et al., 2008; Jaccard et al., 2003). Relationship status was assessed weekly and was recoded into three categories: no relationship, special romantic relationship or emotional/physical contact, and engaged. Slightly more than half the sample reported being in a special relationship and this increased significantly by parity. Seventeen percent of those at parity one were engaged, compared to 7 percent at zero parity. Descriptive statistics for these and other key factors discussed below are shown in Table 1 for the total sample and stratified by parity. Significant differences between respondents at zero parity and parity one are indicated with an *.

Socio-demographic characteristics: Baseline measures assessing the respondent's personal information, school enrolment status, and household structure are included in analyses as important controls known to be associated with non-marital unintended pregnancy (Finer & Zolna 2011, 2014). Personal information includes race, age at baseline, and importance of religion. School enrollment measures include the type of schooling currently enrolled in and highest grade completed. Household structure measures include indicators for childhood public assistance, public assistance at baseline, mother's age at first birth, family structure, and mother's education.

Roughly 25 percent of the total sample was African American, although this was significantly higher among women at parity one (46%). Young mothers were significantly more likely to have dropped out of high school and less likely to be enrolled in a 2-year college, vocational program, or 4-year college. They were also significantly more likely to be receiving public assistance at baseline (67% compared to 10%) and during childhood (55% compared to 26%), to have less educated mothers, and to have grown up with fewer than two parents. Young mothers were significantly older at baseline than non-mothers (19.3 versus 19.2 years).

Prior sexual, contraceptive, and pregnancy experiences: Other important baseline factors account for the respondent's prior fertility-related experiences, including measures for early sexual initiation, for whether the respondent has had two or more sexual partners, has ever had sex without birth control, and has had two or more prior pregnancies (Kirby 2002).

Young mothers had significantly more sexual experience at baseline than non-mothers on average: they were more likely to have had sex by age 16, had at least two sexual partners, had sex without birth control, and to have experienced at least two pregnancies.

Although the study focuses on unintended pregnancy, it is important to consider different outcomes of pregnancies occurring during the study period. In the section below I discuss how I account for pregnancies ending in a live birth. Another potential outcome is abortion. The event is relatively rare among this sample: roughly 2% of respondents received an abortion during the study period, and the percentage of pregnancies ending in an abortion is well below the national average (Finer & Zolna 2016). However, as abortion is one potential pregnancy outcome, and thus might influence subsequent pregnancy-related attitudes and behaviors, I estimated additional models including respondents' attitudes toward abortion (collected at baseline and every three months) as well as a time-varying measure indicating whether a respondent has ever received an abortion. The estimated effects of perceived norms on young women's risk of unintended pregnancy are robust to both sets of measures. Results are not presented for parsimony but can be made available upon request.

All analyses include measures for relationship status, socio-demographic characteristics, and prior related experiences, as well as controls for months in study, months in study squared, and number of completed weekly surveys.

Analytic Approach

As key factors change over time, I utilize the longitudinal nature of the data and model the odds of unintended pregnancy using event-history methods. I test the effects of respondents' perceptions of parents' (or other adults') and friends' injunctive and descriptive pregnancy-related norms on the hazard of unintended first and second parity pregnancy, net of other key factors. Because the data are measured weekly, I use discrete-time methods to estimate these models. Person-weeks are the units of analysis, with respondents considered to be exposed to the risk of unintended pregnancy during any week in which they report that they are not pregnant and are not wanting to become pregnant. Hazard models are estimated separately for those at risk of first (no prior births) and second (one prior birth) parity pregnancies. Respondents who entered the study with no prior births and who reported one birth during the study period are included in both hazard models as their social influences and own attitudes are expected to shift as they transition into a new social role. To estimate the discrete-time hazard models, I use logistic regression in the form

$$\ln\left(\frac{p}{1-p}\right)=a+\sum(B_k)(X_k)$$

where p is the weekly probability of pregnancy, $p/1-p$ is the odds of the conception occurring, a is a constant term, B_k are the effects parameters of the explanatory variables, and X_k are the explanatory variables in the model.

I use a hierarchical modeling strategy, incorporating additional measures to a base model. This nesting strategy presents an opportunity to examine the extent to which respondents'

own attitudes mediate the effects of various perceived norms. Comparing the effects for perceived norms between base and subsequent models allows for evaluation of how these covariates relate to respondents' perceived norms. Results are presented as odds ratios, which can be interpreted as the amount by which the odds are multiplied with each unit change in the respective explanatory variable. An odds ratio greater than 1 indicates a greater hazard of unintended pregnancy, whereas a ratio less than 1 represents a lesser hazard.

Figure 1 depicts the temporal relationship between the main measures of interest. Primary independent variables are time-varying measures of perceived norms. These measures, collected at baseline and every three months thereafter, are lagged four weeks in relation to the weekly measure of pregnancy status ("J-4"). Respondents' pregnancy-related attitudes, also collected at baseline and then every three months, are lagged three weeks in relation to the weekly measure of pregnancy status ("J-3"). Pregnancy intentions, which are collected at baseline and every week thereafter, are lagged two weeks ("J-2") to coincide with the time at which conception likely occurred. Lagging perceived norm (by four weeks) and attitude measures (by three) captures estimated effects occurring *prior* to the sexual intercourse that resulted in the reported unintended pregnancy ("J"), lessening the potential for reverse causation effects. It also captures effects of perceived norms occurring prior to respondents' attitudes. This strategy does not entirely sidestep the reciprocal causation problem, however, because fertility-related attitudes and sexual behavior might influence young women's perceptions and attitudes.

Relationship status is also lagged two weeks to account for status in the week in which conception would have occurred.

RESULTS

Descriptive Statistics

Reports of unintended pregnancies and descriptive statistics for perceived norms and respondent attitudes are presented in Table 2 separately for the full sample, for zero parity, and parity one women. Of the total sample (n=847), 150 respondents, or 17.6%, reported a total of 167 non-marital unintended pregnancies during the 130 weeks of the study. Among the zero parity women (n=718), 108 – or 15.0% of this subsample – reported 115 unintended pregnancies. Among women with one child (n=193), 47 – or 24.4% – reported 52 unintended pregnancies. Of the non-marital unintended pregnancies that women reported during the study period, 64 percent ended in a live birth, 18 percent ended in miscarriage, and 10 percent ended in abortion.

Question 1 (norms: content and referent)—Perceived norms are measured on a scale from 0 to 5, with a higher score representing higher perceived approval (injunctive) and higher perceived prevalence (descriptive) of a given behavior. Thus, higher scores for having sex, having a baby, and being a single mother correspond to greater pronatalist perceived attitudes or behaviors, whereas higher scores for using birth control correspond to lower pronatalist attitudes/behaviors. The first rows in Table 2 refer to injunctive norms - perceived approval. Comparing across the behaviors analyzed here, young women perceive their

parents to react quite positively to their using birth control, but substantially less positive of having a baby, and least positive of having sex. The patterns are similar for that of friends', with one exception: young women who have not experienced a birth perceive their friends to be the least supportive of having a baby, rather than having sex. The next rows refer to descriptive norms - perceived prevalence amongst other adults and friends, rather than approval. Among friends, respondents perceive prevalence to be high for having sex, medium for using birth control, and low-to-medium for being parents. Interestingly, these perceptions of friends' pregnancy-related behaviors are not consistent with perceptions of friends' attitudes: respondents report that friends' prevalence for having sex (3.8, or "many") is higher than perceived approval of it (2.9, or slightly positive), and prevalence for using birth control (2.8, or "some") is lower than perceived approval of it (3.9, or very positive). And, although these young women perceive single motherhood to be relatively prevalent among the adult women in their community (2.9, or "some"), they perceive less tolerance from their parents and friends if they were to become a young mother themselves (1.9 and 2.5, or more negative than positive, respectively).

As far as referents, the first few rows under both injunctive and descriptive norms refer to parents or other adults; the rows directly below them refer to friends. In terms of injunctive norms, young women perceive their friends would react more positively to all three behaviors than their parents: on a scale from 0 ("not at all positively") to 5 ("extremely positively"), friends' perceived approval averages over 3, signaling overall positive reactions, while parents' approval averages 2.4 – slightly more negative than positive. In terms of descriptive norms, young women perceive single motherhood as fairly more prevalent among the women in their neighborhood (2.9, or "some") than among their friends (1.5, or between "none" and "few").

Question 2 (parity)—The middle columns in Table 2 refer to perceived norms for young women at zero parity; the columns on the right refer to those at parity one. Respondents with one child perceived strikingly different social norms around childbearing than their peers with no prior births, with eight of the ten means for perceived norms being statistically significantly larger for parity one than zero parity women (noted with an * in Table 2). Young women with a prior birth reported higher perceived approval by both their parents and friends for having a baby (combined average of 3.4, or positive, compared to 2.0, or slightly negative). They also had higher estimates for the prevalence of single motherhood in their communities, and of sexual intercourse and motherhood among their friends. Respondents with and without a prior birth reported about the same medium-high approval among friends for their use of birth control.

Question 3 (mechanism)—Two mechanisms through which norms are expected to influence young unintended pregnancy are conformity via internalization and superficial conformity, the former of which operates by affecting individual's own fertility-related attitudes and the latter of which, is independent of them. Overall, respondents reported the most positive attitudes toward birth control, less positive attitudes toward children, and the least positive attitudes toward sex. Similar to perceived norms, young mothers' attitudes differed significantly from those of young women who had not experienced a birth. Women

at parity one reported more positive attitudes toward sex and children (2.0 compared to 1.7, and 2.8 compared to 2.5, respectively), and less positive attitudes toward birth control (3.8 compared to 4.0). These averages across parity suggest that women who have had a birth have significantly more pronatalist attitudes.

Models

Table 3 presents odds ratios of perceived norms on the hazard of unintended non-marital pregnancy, stratified by parity. Again, perceived norms are assessed on a scale from 0 to 5, with higher scores representing more perceived approval or prevalence of pregnancy-related behaviors. Here, pronatalist perceptions for having sex, having a baby, and being a single mother are reflected in odds ratios greater than 1, and ratios less than 1 for using birth control. Of important note is that Columns 1 and 4 (noted with † in the table) present results from twenty separate models of the influence of perceived norms on the hazard of pregnancy. Each of the ten perceived norms - injunctive and descriptive for parents (and other adults) and friends - is modeled separately at both zero parity and parity one, totaling twenty models. In other words, each model contains only one measure of perceived norms. Other columns – Columns 2 and 5 - present additive effects for all perceived norms on the odds of pregnancy in a single model; and Columns 3 and 6 add measures for respondents' own attitudes. Columns 1 through 3 present results for the zero parity group – those who are at risk of first parity pregnancies. Columns 4 through 6 present results for the parity one group – those are at risk of second parity pregnancies. The findings presented in Table 3 allow comparisons in several areas, as discussed below: injunctive versus descriptive norms, parent (adult) versus friend referents, zero versus parity one respondents, and conformity via internalization versus superficial conformity mechanisms.

Question 1 (norms: content and referent)—Comparing models across respondents' perceived norms indicates that those regarding approval are the strongest predictors of non-marital unintended pregnancy. Specifically, respondents who perceive stronger approval of childbearing from parents and friends have greater hazards of non-marital unintended pregnancy than women who do not perceive high approval of childbearing (Columns 1 and 4). Higher perceived approval of sex from parents is also associated with a higher risk of pregnancy among respondents with one child (Column 4, $p<.01$). Additionally, higher perceived prevalence of sex among friends increases the risk for young women with no children (Column 1, $p<.05$), whereas perceived approval of friends' birth control usage decreases the risk of pregnancy among non-mothers (Column 1, $p<.05$).

Models 2 and 5 present additive effects on the odds of pregnancy, where all measures of perceived norms are included in the same model, in order to determine the relative importance of the different contents and referents of norms. The results in Table 3 show patterns in the relationship between perceived norms and young unintended pregnancy. For one, injunctive norms are most influential on pregnancy in this age group. For young women with no prior births, each 1-unit increase in the perceived approval of friends for her having a baby results in a 19% increase in the weekly odds of a pregnancy (Model 2; $p<.05$). For respondents with one child, a 1-unit increase in parents' perceived approval for having sex and for having a baby results in increases of 34% and 33%, respectively, in the weekly odds

of pregnancy (Model 5; p<.05). Two, perceptions of others' sexual behaviors are also important, although to a lesser extent: for non-mothers, each 1-unit increase in perceived prevalence of sex among friends increases the weekly odds of pregnancy by 33% (Model 2; p<.01), whereas perceived community prevalence of single motherhood increases young mothers' weekly odds by 36% (Model 5, p<.05). Across models, perceived support for pronatal behaviors (being sexually active and having a baby) are more powerful in predicting unintended pregnancy than support for behaviors protecting against pregnancy (using birth control).

Question 2 (parity)—Results from Models 2 and 5 show that the perceived approval of both parents and friends significantly influence the hazard of unintended pregnancy. However, among respondents with no children, the large decrease in the impact of parents' perceived approval of birth between Models 1† and 2 – that is, before and after friends' perceived approval is added to the model – indicates that the influence of having perceived parental approval is mostly accounted for by its association with having perceived friend approval. Among young mothers, on the other hand, the addition of friends' perceived approval to Model 5 does not change the significance of perceived parental approval of sex and childbearing on the hazard of unintended pregnancy. In sum, friends are more important referents than parents for zero parity women, whereas parents and other adults are most important for parity one women.

Question 3 (mechanisms)—Models 3 and 6 add respondents' own pregnancy-related attitudes to the base models presented in Models 2 and 5. In general, respondents' attitudes do not significantly influence young women's risk of unintended pregnancy, regardless of parity. Comparing estimates across Models 2 and 3, and across Models 5 and 6, however, allow for investigation of the mechanisms through which perceived norms may operate to influence this outcome.

For young women with no children, estimates of the influence of friends' approval of childbearing are consistent across Models 2 and 3, suggesting respondents' own pregnancy-related attitudes do not explain the connection between perceptions of friends' approval and young women's pregnancy odds. Rather, results support the assertion that perceived norms influence young women's unintended pregnancy risk through superficial conformity. The effect of perceived prevalence of sex among friends is similar: the more friends a young woman perceives is having sex, the more likely she is to experience an unintended pregnancy, and this is not because perceptions of friends' behaviors influence her own attitudes toward fertility. For young women with a prior birth (Models 5 and 6), perceived parental approval of sex and childbearing, as well as perceived prevalence of single motherhood in the community, are also related to unintended pregnancy regardless of young women's own related attitudes. The impact of respondents' perceptions of parents' approval and of adults' behaviors remain significant between Models 5 and 6 (p<.05), suggesting that young mothers superficially conform to what they believe are behaviors of which adults approve and engage in themselves.

Table 4 presents results of comparative models based solely on respondents' own attitudes and key controls (columns 1 and 3). These estimates are presented alongside those obtained

in the full models in Table 3 (columns 3 and 6), which were based on respondents' attitudes and perceived norms; estimates of norms are not presented here, but marked with an "X" for parsimony. Model statistics demonstrate that adding perceived norms significantly improves the overall model fit for women at both parities, showing the superiority of models based on respondents' norms and attitudes over those based only on their attitudes.

A Post Hoc Note on Perceived Norms—One additional finding presented in Table 3 is noteworthy. Although the perceived approval of motherhood among young women's friends increases the risk of unintended pregnancy for zero-parity respondents (Models 2 and 3), this perception, as well as that of the perceived prevalence of motherhood among friends, has a negative effect for respondents with a prior birth, as shown in Models 5 and 6. The related odds ratios run counter to my original one-tailed expectations and thus are not marked with an *. These results could reflect a number factors, including that greater social support from other young mothers is more important to parity one than zero-parity women – lowering their risk of loneliness and thus their risk of unintended pregnancy (Edin & Kefalas 2011). This is discussed in more detail below.

DISCUSSION

This analysis provides insight into how young women's attitudes and perceptions of what is common and acceptable in regard to pregnancy-related behaviors interact to influence the risk of unintended pregnancy during a particularly uncertain period in the life course: the transition to adulthood. Taking advantage of unique, time-varying data, I make three key contributions to the literature. First, I compare the relative influence of the contents and referents of perceived norms (*Question 1: norm context and referent*), showing that perceived approval, rather than perceived prevalence, among parents and friends are the stronger predictors of unintended young pregnancy. Further, results show that it is perceived support for pronatal behaviors (being sexually active and having a baby), rather than support for those protecting against pregnancy (using contraception), that is most influential. Second, I estimate these effects among women who have and have not experienced prior births (*Question 2: parity*), shedding light on the differential ways that perceptions of one's social environment influence the hazard of unintended pregnancy depending on motherhood status. I show that friends are central social actors for young women who have not experienced a birth, whereas parents (and adults) play key roles for young mothers. Third, by adding respondent attitudes to predictive models, I show that these norms operate primarily through superficial conformity, or independent of young women's own pregnancy-related attitudes, rather than conformity via internalization (*Question 3: mechanism*).

It is worth noting that many perceived norms do not predict unintended pregnancy among young unmarried women. At the same time, however, results show that clear patterns in the relationship do exist. Among non-mothers, the risk of unintended pregnancy is governed by what they perceive their friends think and do, rather than their parents, and this is unrelated to their own attitudes. So, the perception of pronatalist norms among friends – namely, the more that young women perceive friends to engage in sex and approve of their having a baby - encourages pregnancy through superficial conformity. That young women are highly susceptible to what they perceive is normative and acceptable behavior among friends is

hardly surprising. What is notable, however, is that these perceptions influence a highly consequential outcome - getting pregnant - which these young women really do not want. Among young mothers, in contrast, perceptions of how much their parents approve of them having sex and of their bearing children, and the prevalence of single motherhood in the community, independently increase their risk of experiencing an unintended pregnancy. These effects also operate largely through superficial conformity, but likely in a different way and for different reasons than for young childless women. Because these women have a child, they may turn more to their parents than their friends, looking for financial and emotional support that might be difficult to obtain elsewhere (Unger & Wandersman 1985). Networks tend to be more supportive of a specific behavior when members have already experienced the behavior of interest (i.e., parents are more pronatal), in turn positively influencing the risk of subsequent pregnancy. Regardless of parity, however, young women behave in accordance with what they perceive are normative attitudes and prevalent behaviors of others in their immediate social sphere: friends for non-mothers and parents and women in the community for mothers.

Additional consideration, however, must be given to the referents of perceived pronatal norms for young mothers. Post hoc results suggest that pronatal social support from different sources – parents (other adults) and friends - might influence young mothers' subsequent pregnancy risks differently. Although perceived pronatal parental attitudes increase a woman's risk of unintended pregnancy, supportive attitudes toward and prevalence of motherhood among friends may decrease her risk. So, in contrast to adults, from whom young women may feel social pressure to conform to what they believe adults think and do, spending time with other young women in similar social positions might instead provide much-needed confidence to navigate her circumstances as a young mother while also pursuing other roles (such as student).

Overall, results are consistent with the theory of planned behavior framework, as well as literature citing the importance of social norms in explaining behavioral outcomes (e.g., Mollborn 2010; Mollborn et al., 2014; Santelli et al., 2004). That perceived approval and, to a lesser extent, prevalence of pronatal behaviors have positive effects, net of key controls, points to the importance of young women's social environment – and their perceptions of it – to the study of pregnancy-related behavioral patterns. This study goes further, disentangling the effects of perceived norms related to having sex, using birth control, and bearing children, analyzing which contents, sources, and mechanisms are most powerful in predicting unintended pregnancy during the late teenage years and early 20s. I show that both parents and friends are important referents under different conditions during this life period – a period fraught with transition and uncertainty. Results suggest that, rather than childhood socialization and desires or pressure to conform to peers competing for influence, young women's social needs change alongside significant personal experiences. And that perceived approval is influential, independent of young women's own pregnancy attitudes, underscores that the desire to please or seek rewards from salient social actors is strong among women of this age, regardless of referent. Further, the predictive power of specific norms - having sex and childbearing – over others – contracepting - suggests that pronatal social environments may increase a young woman's risk of engaging in sex. In contrast, translating perceived support for birth control into behavior may prove difficult: diverse

options exist, and they often necessitate advanced planning and access to resources. This does not imply that young women do not exert any agency. Rather, findings highlight how critical other social actors are when considering unintended outcomes. Of course, these outcomes might also occur due to alternative explanations, such as mass media messages, parent-child closeness, parental supervision, (see Miller & Benson 2001), or social contagion (Rodgers et al., 1998), which is beyond the scope of this analysis but warrants further investigation.

These findings have important policy implications. They highlight the importance of targeting peer networks, as well as young women and their parents, in reducing the risk of unintended young pregnancy. For young childless women, policies and programs should address the social environment in which these young women are embedded, sharing information and resources at a school, church, or community level. As the majority of these young women are enrolled in school – either high school or higher education - such efforts could work through health education course materials or through the provision of after-school programs and/or school clubs and groups. And, given the importance of peers for this group, identifying important neighborhood social spaces, such as health centers, transportation hubs, large markets, or churches, would also allow for dissemination of important information on these topics outside of school settings for those women not currently enrolled. For young mothers, policies and programs should involve their parents. Providing intergenerational support groups or information could highlight the consequences of young childbearing, the importance of which might resonate with parents, who then, in turn, have the resources and social power to influence their daughters' behaviors. Most critically, that these effects vary by parity suggests that policy makers need to keep individuals' previous experiences in mind when determining young women's most influential social ties. This approach differs from more traditional interventions that focus on young women either individually or as part of a dyad, such as a romantic partner or a parent-child relationship. Rather, policy interventions should think of unintended pregnancy as both an event occurring within a greater social context, as well as during a particularly unstable stage in the life course.

This study highlights the need for further investigation. Importantly, aside from controlling for relationship status, it does not investigate the role that partners and perceptions of their attitudes might play in non-marital unintended pregnancy risks, particularly whether the consistency of a romantic relationship offsets the normative influences of parents and friends that were found here. Further, it considers the perceptions of social norms and attitudes of young women only, excluding how these may influence pregnancy-related behaviors for men. How men perceive others' attitudes about and prevalence of parenthood could also play an important role in determining these behaviors. Second, the study focuses on the life stage in which young women experience the highest risk of unintended pregnancy. However, how perceived norms influence similar outcomes for women at different stages of the life course would allow for a deeper investigation of how social actors and networks influence unintended behaviors, including drug and alcohol use, over a wider range of years (e.g., Balbo & Barban 2014). Third, the study does not analyze the source of differences in normative influences for first- versus higher-order births. However, descriptive statistics in Table 1 and supplemental analyses among those women who experience a birth during the

study period (not presented) support two potential hypotheses. One is selection into an early first birth: that women who experience motherhood at a young age are different from those who do not, and they may well have different social environments from the start. The second is parity differences: young mothers' perceptions may change after having a child. While outside the scope of this paper, the subject highlights the need for further examination.

In all, this study of the effects of perceived norms on non-marital unintended pregnancies among young women provides a foundation for future work investigating how an individual's perceptions of her social reality affect her behaviors. In particular, it points to the strong social effects of other actors in explaining behaviors occurring during a life stage often fraught with uncertainty and multiple scripts from which to draw. It also shows that parenthood, similar to other major events, is an important life transition that signals a shift in social roles and networks – a shift that needs to be considered when investigating social effects on behavioral patterns and designing policy interventions aimed targeting unintended young pregnancy. Last, the study makes important contributions to larger conversations about fertility and family influences on young adult behavior. Specifically, it shows that a young woman's perceptions of others' attitudes and behaviors – rather than her own attitudes - help explain the continued high rates of pregnancies occurring among young adults who do not want to get pregnant. And while it shows that young women continue to behave in ways they believe align with their parents' approval, this relationships depends largely on whether the young women are parents themselves.

Acknowledgments

I would like to thank the participants of the Demography and the Relationship Dynamics and Social Life Study working groups, particularly Jennifer Barber and Yasamin Kusunoki, for their helpful feedback on earlier versions of this manuscript. An earlier version of this work was presented at the 2014 Population Association of America and the 2015 American Sociological Association Annual Meetings and I thank audience members for their thoughtful comments. This research was supported in part by a National Institute of Child Health and Human Development training grant to the Populations Studies Center at the University of Michigan (T32 HD007339). The collection of data used in this study was supported by two grants from the National Institute of Child Health and Human Development (R01 HD050329, R01 HD050329-S1, PI Barber), a grant from the National Institute on Drug Abuse (R21 DA024186, PI Axinn), and a population center grant to the University of Michigan's Population Studies Center (R24 HD041028).

References

Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes. 1991; 50(2):179–211.

Ajzen, I., Fishbein, M. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall; 1980.

Alwin, DF., Cohen, RL., Newcomb, TM. Political attitudes over the life span. Madison, WI: University of Wisconsin Press; 1991.

Amato PR, Kane JB. Parents' Marital Distress, Divorce, and Remarriage: Links With Daughters' Early Family Formation Transitions. J of Family Issues. 2011; 32(8):1073–1103.

Ashcraft A, Fernández-Val I, Lang K. The Consequences of Teenage Childbearing: Consistent Estimates When Abortion Makes Miscarriage Non-random. The Economic Journal. 2013; 123(571): 875–905. [PubMed: 24443589]

Axinn WG, Thornton A. Mothers, Children, and Cohabitation: The Intergenerational Effects of Attitudes and Behavior. American Sociological Review. 1993; 58(2):233.

Balbo N, Barban N. Does Fertility Behavior Spread among Friends? American Sociological Review. 2014; 79(3):412–431.

Barber JS. Intergenerational Influences on the Entry into Parenthood: Mothers' Preferences for Family and Nonfamily Behavior. Social Forces. 2000; 79(1):319.

Barber JS. The intergenerational transmission of age at first birth among married and unmarried men and women. Social Science Research. 2001; 30(2):219–247.

Barber JS. The Theory of Planned Behavior: considering drives, proximity, and dynamics. Vienna Yearbook of Population Research/Vienna Institute of Demography, Austrian Academy of Sciences. 2011; 9:31–35.

Barber JS, Kusunoki Y, Gatny HH. Design and implementation of an online weekly journal to study unintended pregnancies. Vienna yearbook of population research/Vienna Institute of Demography, Austrian Academy of Sciences. 2011; 9:327–334.

Baumer EP, South SJ. Community Effects on Youth Sexual Activity. Journal of Marriage and Family. 2001; 63(2):540–554.

Baydar N. Consequences for Children of Their Birth Planning Status. Family Planning Perspectives. 1995; 27(6):228. [PubMed: 8666086]

Blumer, H. Symbolic Interactionism: Perspective and Method. University of Cal Press; 1986.

Brown B, Clasen DR, Eicher SA. Perceptions of peer pressure, peer conformity dispositions, and self-reported behavior among adolescents. Developmental Psychology. 1986; 22(4):521–530.

Brown, SS., Eisenberg, L. The Best Intentions: Unintended Pregnancy and the Well-Being of Children and Families. National Academies Press; 1995.

Buhi ER, Goodson P. Predictors of Adolescent Sexual Behavior and Intention: A Theory-Guided Systematic Review. Journal of Adolescent Health. 2007; 40(1):4–21. [PubMed: 17185201]

Chodorow, N. The reproduction of mothering. Berkeley, CA: University of Cal. Press; 1978.

Crissey SR. Effect of Pregnancy Intention on Child Well-Being and Development: Combining Retrospective Reports of Attitude and Contraceptive use. Population Research and Policy Review. 2006; 24(6):593–615.

De Valk H, Liefbroer AC. Timing Preferences for Women's Family-Life Transitions: Intergenerational Transmission Among Migrants and Dutch. Journal of Marriage and Family. 2007; 69(1):190–206.

Duncan OD, Freedman R, Coble JM, Slesinger DP. Marital Fertility and Size of Family of Orientation. Demography. 1965; 2(1):508–515.

Edin, K., Kefalas, M. Promises I Can Keep: Why Poor Women Put Motherhood before Marriage. University of California Press; 2011.

Eggleston E, Tsui AO, Kotelchuck M. Unintended pregnancy and low birthweight in Ecuador. American Journal of Public Health. 2001; 91(5):808–810. [PubMed: 11344894]

Elder GH. Family History and the Life Course. Journal of Family History. 1977; 2(4):279–304. [PubMed: 11610128]

Elder GH. Age Differentiation and the Life Course. Annual Rev of Sociology. 1975; 1:165–190.

Elder, GH., Jr, Kirkpatrick Johnson, M., Crosnoe, R. The Emergence and Development of Life Course Theory. In: Mortimer, JT., Shanahan, MJ., editors. Handbook of the Life Course Handbooks of Sociology and Social Research. Springer; US: 2003. p. 3-19.

Fine, MA., Fincham, FD. Handbook of Family Theories: A Content-based Approach. Routledge; 2013.

Finer LB, Kost K. Unintended pregnancy rates at the state level. Perspectives on Sexual and Reproductive Health. 2011; 43(2):78–87. [PubMed: 21651706]

Finer LB, Zolna MR. Declines in unintended pregnancy in the United States, 2008–2011. New England Journal of Medicine. 2016; 374(9):843–852. [PubMed: 26962904]

Finer LB, Zolna MR. Shifts in intended and unintended pregnancies in the United States, 2001–2008. American Journal of Public Health. 2014; 104(S1):S43–S48. [PubMed: 24354819]

Finer LB, Zolna MR. Unintended pregnancy in the United States: incidence and disparities, 2006. Contraception. 2011; 84(5):478–485. [PubMed: 22018121]

Fishbein M, Ajzen I. Belief, attitude, intention and behavior: an introduction to theory and research. 1975

Fishbein, M., Ajzen, I. Predicting and Changing Behavior: The Reasoned Action Approach. Taylor & Francis; 2011.

Furstenberg FE. Teenage Childbearing as a Public Issue and Private Concern. Annual Review of Sociology. 2003; 29:23–39.

Gardner M, Steinberg L. Peer Influence on Risk Taking, Risk Preference, and Risky Decision Making in Adolescence and Adulthood: An Experimental Study. Developmental Psychology. 2005; 41(4): 625–635. [PubMed: 16060809]

Gazmararian JA, et al. The relationship between pregnancy intendedness and physical violence in mothers of newborns. Obstetrics & Gynecology. 1995; 85(6):1031–1038. [PubMed: 7770250]

Gibbons FX, Gerard M, McCoy SB. Prototype perception predicts (lack of) pregnancy prevention. Personality and Social Psychology Bulletin. 1995; 21(1):85–93.

Gipson JD, Koenig MA, Hindin MJ. The effects of unintended pregnancy on infant, child, and parental health: a review of the literature. Studies in family planning. 2008; 39(1):18–38. [PubMed: 18540521]

Hamilton BE, Martin JA, Osterman MJ, Curtin SC, Mathews TJ. Births: Preliminary Data for 2015. National Vital Statistics Reports. 2016; 65(3)

Halpern-Felsher BL, Cornell JL, Kropp RY, Tschann JM. Oral Versus Vaginal Sex Among Adolescents: Perceptions, Attitudes, and Behavior. Pediatrics. 2005; 115(4):845–851. [PubMed: 15805354]

Hay C, Evans MM. Has Roe v. Wade Reduced U.S. Crime Rates? Examining the Link Between Mothers' Pregnancy Intentions and Children's Later Involvement in Law-Violating Behavior. Journal of Research in Crime and Delinquency. 2006; 43(1):36–66.

Heavey EJ, Moysich KB, Hyland A, Druschel CM, Sill MW. Female Adolescents' Perceptions of Male Partners' Pregnancy Desire. The Journal of Midwifery & Women's Health. 2008; 53(4):338–344.

Hogan DP, Kitagawa EM. The impact of social status, family structure, and neighborhood on the fertility of black adolescents. American journal of Sociology. 1985:825–855.

Huinink J, Kohli M. A life-course approach to fertility. Demographic Research. 2014; 30:1293–1326.

Jaccard J, Dodge T, Dittus P. Do adolescents want to avoid pregnancy? Attitudes toward pregnancy as predictors of pregnancy. Journal of Adolescent Health. 2003; 33(2):79–83. [PubMed: 12890598]

Jennings EA, Axinn WG, Ghimire DJ. The Effect of Parents' Attitudes on Sons' Marriage Timing. American Sociological Review. 2012; 77(6):923–945. [PubMed: 23483623]

Kinsman SB, Romer D, Furstenberg FF, Schwarz DF. Early Sexual Initiation: The Role of Peer Norms. Pediatrics. 1998; 102(5):1185–1192. [PubMed: 9794952]

Kirby D. Antecedents of adolescent initiation of sex, contraceptive use, and pregnancy. American journal of health behavior. 2002; 26(6):473–485. [PubMed: 12437022]

Kost, KS., Henshaw, LC. US teenage pregnancies, births and abortions: national and state trends and trends by race and ethnicity. Guttmacher Institute; 2010.

Kost K, Lindberg L. Pregnancy intentions, maternal behaviors, and infant health: investigating relationships with new measures and propensity score analysis. Demography. 2015; 52(1):83–111. [PubMed: 25573169]

Krosnick JA, Alwin DF. Aging and susceptibility to attitude change. Journal of Personality and Social Psychology. 1989; 57(3):416–425. [PubMed: 2778632]

Lau Y. Does pregnancy provide immunity from intimate partner abuse among Hong Kong Chinese women? Social Science and Medicine. 2005; 61(2):365–377. [PubMed: 15893052]

Lau Y, Wong Fu Keung D. Correlates of depressive symptomatology during the second trimester of pregnancy among Hong Kong Chinese. Social Science and Medicine. 2007; 64(9):1802–1811. [PubMed: 17316942]

Liefbroer AC, Billari FC. Bringing norms back in: A theoretical and empirical discussion of their importance for understanding demographic behaviour. Population, Space and Place. 2010; 16(4): 287–305.

Longmore MA, Eng AL, Giordano PC, Manning WD. Parenting and Adolescents' Sexual Initiation. Journal of Marriage and Family. 2009; 71(4):969–982. [PubMed: 20160871]

Mead, GH. Mind, Self, and Society: From the Standpoint of a Social Behaviorist. University of Chicago Press; 2009[1934].

Miller BC, Benson B. Relationships and adolescent pregnancy risk: A research synthesis. Developmental Review. 2001; 21:1–38.

Miller WB, Barber JS, Gatny HH. The effects of ambivalent fertility desires on pregnancy risk in young women in Michigan, United States. Population studies. 2013; 67(1):25–38. [PubMed: 23234316]

Mollborn S. Making the Best of a Bad Situation: Material Resources and Teenage Parenthood. Journal of Marriage and Family. 2007; 69(1):92–104. [PubMed: 21921967]

Mollborn S. Predictors and Consequences of Adolescents' Norms Against Teenage Pregnancy. Sociological Quarterly. 2010; 51(2):303–328. [PubMed: 21921969]

Mollborn S, Sennott C. Bundles of Norms About Teen Sex and Pregnancy. Qualitative Health Research. 2015; 25(9):1283–1299. [PubMed: 25387911]

Mollborn S, Domingue BW, Boardman JD. Norms as Group-Level Constructs: Investigating School-Level Teen Pregnancy Norms and Behaviors. Social Forces. 2014; 93(1):241.

Montgomery MR, Casterline JB. Social Learning, Social Influence, and New Models of Fertility. Population and Development Review. 1996; 22:151.

Morgan SP, Waite LJ. Parenthood and the Attitudes of Young Adults. American Sociological Review. 1987; 52(4):541–547.

Rodgers JL, Rowe DC, Buster M. Social contagion, adolescent sexual behavior, and pregnancy: A nonlinear dynamic EMOSA model. Developmental Psychology. 1998; 34(5):1096. [PubMed: 9779754]

Romer D, et al. Social influences on the sexual behavior of youth at risk for HIV exposure. American Journal of Public Health. 1994; 84(6):977–985. [PubMed: 8203696]

Santelli J, et al. The Measurement and Meaning of Unintended Pregnancy. Perspectives on Sexual and Reproductive Health. 2003; 35(2):94–101. [PubMed: 12729139]

Santelli JS, et al. Initiation of sexual intercourse among middle school adolescents: the influence of psychosocial factors. Journal of Adolescent Health. 2004; 34(3):200–208. [PubMed: 14967343]

Sennott C, Mollborn S. College-bound teens' decisions about the transition to sex: Negotiating competing norms. Advances in Life Course Research. 2011; 16(2):83–97. [PubMed: 22439133]

Singh S, Darroch JE. Adolescent Pregnancy and Childbearing: Levels and Trends in Developed Countries. Family Planning Perspectives. 2000; 32(1):14. [PubMed: 10710702]

Singh S, Sedgh G, Hussain R. Unintended pregnancy: worldwide levels, trends, and outcomes. Studies in family planning. 2010; 41(4):241–250. [PubMed: 21465725]

Steenhof L, Liefbroer AC. Intergenerational transmission of age at first birth in the Netherlands for birth cohorts born between 1935 and 1984: Evidence from municipal registers. Population studies. 2008; 62(1):69–84. [PubMed: 18278674]

Steinberg L. A social neuroscience perspective on adolescent risk-taking. Developmental Review. 2008; 28(1):78–106. [PubMed: 18509515]

Trent K, South SJ. Sociodemographic Status, Parental Background, Childhood Family Structure, and Attitudes toward Family Formation. Journal of Marriage and the Family. 1992; 54(2):427–439.

Udry, R. Proposal to NICHD for ADD Health project. 1993.

Unger D, Wandersman L. Social support and adolescent mothers: Action research contributions to theory and application. Journal of Social Issues. 1985; 41(1):29–45.

United Nations. International data: United Nations Demographic Yearbook. 2008.

Ventura SJ, Hamilton BE, Matthews TJ. National and state patterns of teen births in the United States, 1940–2013. National vital statistics reports. 2014; 63(4):1–34.

Waite LJ, Goldscheider FK, Witsberger C. Nonfamily Living and the Erosion of Traditional Family Orientations Among Young Adults. American Sociological Review. 1986; 51(4):541–554.

Watts G, Nagy S. Sociodemographic Factors, Attitudes and Expectations Toward Adolescent Coitus. American Journal of Health Behavior. 2000; 24(4):309–317.

Yakusheva O, Fletcher J. Learning from Teen Childbearing Experiences of Close Friends: Evidence using Miscarriages as a Natural Experiment. The Review of Economics and Statistics. 2015; 97(1): 29–43.

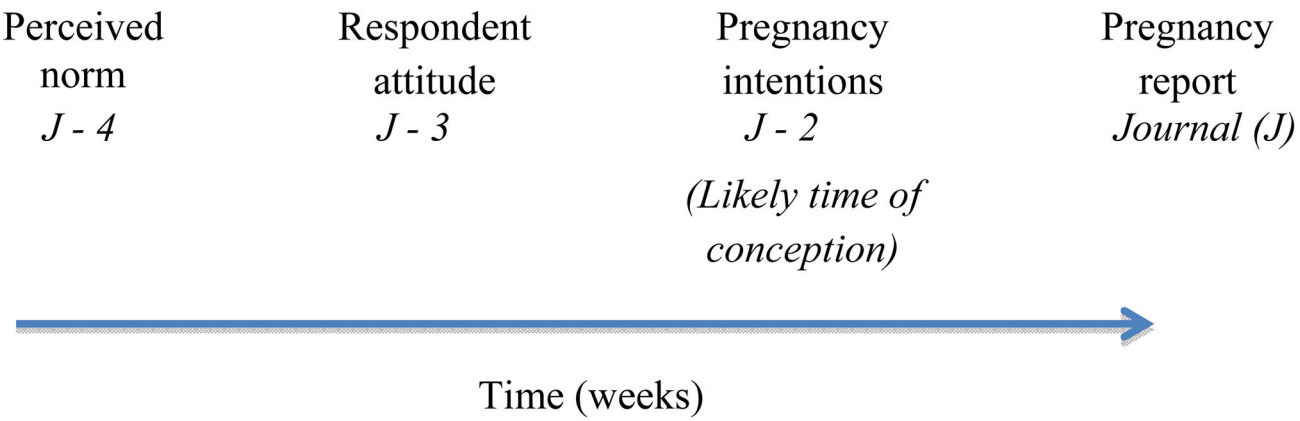

FIGURE 1.
DEPICTION OF THE TEMPORAL ORDERING OF KEY MEASURES OF INTEREST

Table 1

Descriptive Statistics for Other Key Factors Used as Control Variables in Analyses

	Full Sample (n=847) (48,736 person-weeks)		Zero Parity (no prior births) (n=718) (43,853 person-weeks)		Parity One (one prior birth) (n=193) (4,883 person-weeks)	
Measure	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Relationship status						
No relationship*	0.41	0.49	0.42	0.49	0.30	0.46
Special relationship*	0.51	0.50	0.51	0.50	0.53	0.50
Engaged*	0.08	0.26	0.07	0.25	0.17	0.37
Socio-demographic characteristics						
Personal information						
African American*	0.26	0.44	0.24	0.42	0.46	0.50
Age at baseline*	19.18	0.58	19.17	0.58	19.27	0.55
High religious importance*	0.56	0.50	0.55	0.50	0.60	0.49
School enrolment						
Dropped out of high school/not enrolled*	0.04	0.20	0.03	0.17	0.13	0.33
Completed high school/not enrolled*	0.16	0.36	0.13	0.34	0.34	0.47
Enrolled in high school*	0.13	0.34	0.13	0.33	0.16	0.37
Enrolled in 2-year college or vocational program*	0.30	0.46	0.31	0.46	0.27	0.44
Enrolled in 4-year college*	0.37	0.48	0.40	0.49	0.11	0.31
Household structure						
Childhood public assistance*	0.29	0.45	0.26	0.44	0.55	0.50
Receiving public assistance*	0.16	0.36	0.10	0.30	0.67	0.47
Biological mother less than 20 years old at first birth*	0.28	0.45	0.25	0.43	0.54	0.50
Grew up with two parents (both bio or bio/step)*	0.63	0.48	0.65	0.48	0.38	0.48
Mother's education less than high school graduate*	0.06	0.23	0.05	0.21	0.13	0.33
Prior sexual, contraceptive, and pregnancy experiences						
Age at first sex 16 or less*	0.39	0.49	0.34	0.47	0.85	0.36
Number of sexual partners 2 or more*	0.48	0.50	0.44	0.50	0.86	0.34
Ever had sex without birth control*	0.33	0.47	0.27	0.44	0.85	0.36

Measure	Full Sample (n=847) (48,736 person-weeks)		Zero Parity (no prior births) (n=718) (43,853 person-weeks)		Parity One (one prior birth) (n=193) (4,883 person-weeks)	
	Mean	SD	Mean	SD	Mean	SD
Number of prior pregnancies 2+*	0.13	0.34	0.05	0.23	0.80	0.40

Notes. All measures are dichotomous. An * indicates statistically significant ($p<.05$) difference between zero parity and parity one respondents; two-sample *t* tests

Table 2

Descriptive Statistics for Measures of Perceived Norms and Respondent Attitudes

	Full Sample (n=847) (48,736 person-weeks)		Zero Parity (no prior births) (n=718) (43,853 person-weeks)		Parity One (one prior birth) (n=193) (4,883 person-weeks)	
Number of unintended pregnancies	167		115		52	
Percent of respondents reporting unintended pregnancy	17.60%		15.00%		24.40%	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Injunctive Norms (approval)						
Parents						
How would your parents react if you…						
…had sex*	1.75	1.32	1.71	1.29	2.18	1.51
…were using birth control*	3.49	1.60	3.42	1.60	4.11	1.40
…had a baby*	1.91	1.65	1.77	1.57	3.16	1.77
Friends						
How would your friends react if you…						
…had sex*	2.85	1.30	2.86	1.28	2.79	1.48
…were using birth control	3.89	1.29	3.89	1.26	3.91	1.56
…had a baby*	2.48	1.57	2.34	1.52	3.67	1.52
Descriptive Norms (prevalence)						
Adults						
How many women in your community are…						
…single parents?*	2.87	1.14	2.82	1.13	3.38	1.20
Friends						
How many of your friends…						
…have had sex*	3.84	1.43	3.77	1.44	4.44	1.12
…are using birth control*	2.80	1.40	2.79	1.39	2.90	1.49
…are parent*	1.52	1.26	1.39	1.17	2.65	1.45
Mechanisms: Respondent Attitudes						
Sex (scale)*	1.76	0.92	1.74	0.94	1.96	0.76
Birth control (scale)*	4.01	0.80	4.04	0.79	3.76	0.87

	Full Sample		Zero Parity (no prior births)		Parity One (one prior birth)	
	(n=847) (48,736 person-weeks)		(n=718) (43,853 person-weeks)		(n=193) (4,883 person-weeks)	
Baby (scale)*	2.51	0.73	2.47	0.73	2.84	0.68

Notes: An * indicates statistically significant difference between zero parity and parity one respondents ($p<.05$, two-tailed, two-sample *t* tests).

Injunctive norms are on a scale from 0–5, with 0="not al all positive" and 5="extremely positive"

Descriptive norms are on a scale from 0–5, with 0="none" and 5="almost all"

Respondent attitudes are on a scale from 0–5, with 0="strongly disagree" and 5="strongly agree"

Table 3

Models of the Relationship Between Perceived Norms and the Hazard of Non-Marital Unintended Pregnancy

	Zero Parity (no prior births)			Parity one (one prior birth)		
	1†	2	3	4†	5	6
Injunctive (approval)						
Parents						
Sex	1.01 (.10)	0.96 (.10)	0.94 (.10)	1.42**(.20)	1.34*(.18)	1.34*(.18)
Birth Control	0.97 (.09)	1.00 (.10)	1.02 (.10)	1.18 (.21)	1.09 (.16)	1.08 (.16)
Baby	1.16*(.09)	1.07 (.09)	1.08 (.09)	1.33*(.20)	1.33*(.20)	1.33*(.20)
Friends						
Sex	0.85 (.09)	0.86 (.09)	0.85 (.09)	1.03 (.16)	1.12 (.16)	1.14 (.16)
Birth Control	0.81*(.08)	0.88 (.09)	0.90 (.10)	1.02 (.15)	1.10 (.15)	1.11 (.15)
Baby	1.23**(.10)	1.19*(.11)	1.18*(.11)	0.94 (.14)	0.76 (.11)	0.75 (.11)
Descriptive (prevalence)						
Adults						
Single motherhood in community	0.99 (.10)	0.93 (.10)	0.93 (.10)	1.29 (.26)	1.36*(.25)	1.36*(.24)
Friends						
Sex	1.28*(.15)	1.33**(.16)	1.35**(.16)	0.85 (.19)	0.95 (.19)	0.96 (.19)
Birth Control	0.89 (.08)	0.89 (.08)	0.90 (.08)	0.87 (.14)	0.82 (.11)	0.81 (.11)
Baby	1.14 (.11)	1.04 (.10)	1.04 (.10)	0.65 (.11)	0.62 (.10)	0.62 (.10)
Mechanisms: Respondent Attitudes						
Sex			1.04 (.17)			0.69 (.19)
Birth Control			0.80 (.13)			0.91 (.22)
Baby			0.94 (.17)			1.38 (.39)
Constant		0.02 (.11)	0.08 (.42)		0.00 (.00)	0.00 (.00)
Chi square		102.8	102.04		46.73	49.11
p		0.00	0.00		0.03	0.05
Log likelihood		−676.23	−675.13		−239.12	−237.59
Person weeks	43853	43853	43853	4883	4883	4883

Notes: Columns 2–3 and 5–6 each represent a logistic regression model. Results are presented as odds ratios. Standard errors in parentheses. Each model controls for relationship, socio-demographic characteristics, prior related experiences, months in study, months in study squared, and number of completed surveys. These controls are not presented for parsimony.

† These columns present the results of twenty separate models -- each model includes a single measure of a perceived norm, and the control variables.

* p < .05;

** p < .01;

*** p < .001; one-tailed tests

Table 4

Models of the Relationship between Attitudes and the Hazard of Non-Marital Unintended Pregnancy

	Zero Parity		Parity one	
	1	**2**	**3**	**4**
Perceived Norms				
		X		X
Mechanisms: Respondent Attitudes				
Sex	1.02 (.18)	1.04 (.17)	0.71 (.24)	0.69 (.19)
Birth Control	0.77 (.13)	0.80 (.13)	0.89 (.26)	0.91 (.22)
Baby	0.98 (.17)	0.94 (.17)	1.40 (.47)	1.38 (.39)
Constant	0.02 (.13)	0.08 (.42)	0.00 (.00)	0.00 (.00)
Chi square	82.21	102.04	24.14	49.11
p	0.00	0.00	0.45	0.05
Log likelihood	−685.44	−675.13	−250.42	−237.59
Person weeks	43853	43853	4883	4883

Notes: All columns represent a logistic regression model. Results are presented as odds ratios. Standard errors in parentheses. Each model controls for relationship, socio-demographic characteristics, prior related experiences, months in study, months in study squared, and number of completed surveys. These controls are not presented for parsimony.

Columns 1 and 3 present results from models including just respondents' attitudes and the controls. Columns 2 and 4 present results from similar models, but including all ten perceived norms (adults' and friends' injunctive and descriptive) as well.

*
p < .05;

**
p < .01;

***
p < .001; one-tailed tests