The Relationship Contexts of Births Across Reproductive Ages: A Multi-State Life Table Approach

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Abstract

The decline of the general fertility rate in the U.S. over the last decade obscures the heterogeneity of birth patterns by age group. Using NSFG data from 2006–2015, this study explores one potential explanation for these changing patterns—women's partnership contexts surrounding birth events—across five-year age groups for women aged 15–44. If birth rates are changing over time, then ascertaining the partnership statuses of women who experience births will provide insight into how fertility relates to women's relationship statuses throughout their reproductive years. The description of several indicators of relationship context for women who have experienced a birth, including relationship type, duration, and order, will provide essential information about sexual partnerships; and the construction of a multi-state life table will yield probability estimates of transitioning between relationship states. Preliminary results display differential trends in fertility, sexual partnership, relationship status, and partnership transitions by five-year age groups.

Introduction & Research Questions

Over the past decade, the general fertility rate in the U.S. has declined by approximately 11%. This decline resonates with our understanding of striking birth patterns among subgroups of women; for example, the teenage birth rate has been continuously declining since the early 1990s (Hamilton & Mathews, 2016). However, in a wider view, this single number hides the heterogeneity of birth patterns by age group. While the birth rate for women aged 20–24 has been dropping, the birth rate for women aged 35–39 has been increasing (Martin, Hamilton & Osterman, 2017). Such changes in birth rates may be associated with other changes in fertility decision making. One potential explanation for these changing patterns is the relationship context of births—more specifically, the partnership status of women during the period of conception, pregnancy, and birth. If birth rates are changing over time, then ascertaining the partnership statuses of women who experience births will provide insight into how fertility patterns relate to women's relationship statuses throughout their reproductive years.

The present study explores the context of births—relationship type, duration, and order—for women in the U.S. over the past decade. The changing partnership contexts of births are well documented, as prior research has established that births in the U.S. are more frequently occurring outside of marital relationships (Bumpass & Lu, 2000). Improving our understanding of the context of births for women of different age groups is important for several reasons. Scholarship points to the varying effects of mothers' relationship contexts during and after pregnancy on both mothers and children, including, but not limited to, economic and health (dis)advantages, and these effects vary by age. Further, the age-specific birth rate in U.S. consistently differs from that of most other Western countries for some age groups; while the U.S. has experienced a decline in the teen birth rate, nevertheless this rate remains higher than that in most other Western countries (Sedgh et al., 2015). Obtaining fine-grained details about mothers' relationship type and duration will shed light on these variations.

In order to determine how the relationship contexts of birth vary across reproductive ages, the present research pursues the following multi-layered question:

- **How do the following differ by five-year age groups within the reproductive age span defined by the NSFG's sampling frame (15–44)?**
    - **Women's relationship contexts surrounding birth events**
    - **Women's relationship duration prior to and following birth events**
    - **Women's relationship type transitions surrounding birth events**

By addressing the above, understanding the relationship contexts of births may advance our ability to account for variations in age-specific birth rates; expand explanations for the uneven decline among women of reproductive ages beyond individual characteristics to patterned behaviors; and demonstrate implications of current policy interventions to influence pregnancy exposure.

Background

Three aspects of relationship context are of particular interest: type, duration, and order. The impacts of the first, relationship type, are catalogued by a vast body of research into the associations between partnership status and parent–child outcomes, and between age and partnership status. Conclusions about effects of relationship type remain unsettled. Published in the same year, two studies about cohabiting relationships came to seemingly opposite conclusions: on the one hand, unintended births increase the likelihood of relationship dissolution; on the other hand, whether relationships are established pre- or post-conception does not affect their chances of dissolution (Guzzo & Hayford, 2012; Rackin & Gibson-Davis, 2012). When considering the context of births, parental relationships matter.

The second relationship aspect, duration, refers to the length of the relationship in a particular state. In the case of cohabitation, the duration of the relationship prior to coresidence is positively associated with union stability (Schnor, 2015). Pregnancy risk can also vary by relationship duration. Evidence from Britain indicates that the proportion of women younger than 25 using of an unreliable method or no method decreased as relationship duration increased (Firman et al., 2015). A study of the associations between young adults' relationship characteristics and their rates of unintended childbearing found that the occurrence of first sex prior to the establishment of the relationship (beginning to date) was associated with a higher likelihood of using any method of contraceptive method at last sex, whereas

discussions of marriage and/or cohabitation and relationship conflict were both associated with reduced odds of having used any method (Manlove et al., 2011). Taken together, such studies suggest that relationship context has implications for contraceptive use and risk of pregnancy exposure.

Finally, the third relationship aspect, order, represents the comparison of two relationship types in the event of a relationship transition. The order in which relationship types occur can impact for the duration and quality of the relationship. Data from Finland shows that the risk of separation following cohabitation is greater at the beginning of the union, whereas separation levels drop following entry into marriage (Jalovaara & Kulu, 2018). In the case of premarital cohabitation and marriage, a meta-analysis of research found that, in aggregate, cohabitation prior to marriage has a negative association with marital stability and marital quality (Jose, O'Leary & Moyer, 2010). The timing of these transitions may depend on the presence of a pregnancy event. Data from the National Survey of Family Growth (NSFG) show that a higher proportion of pregnant women transition to cohabitation than to marriage before marriage (Lichter, Sassler & Turner, 2014). Transitions between partnership types can have consequences for the relationships themselves and can both precipitate and be precipitated by birth events.

Data, Methods, and Proposed Analysis

This study utilizes nationally representative data from the NSFG to observe the relationship contexts of births. Conducted by the National Center for Health Statistics, the NSFG poses a range of questions pertaining to health and sexual behaviors, in addition to partnership and reproductive histories, to approximately 10,000 men and women (per data wave) in their reproductive ages (15–44 years old). Leveraging the data waves capturing changes in the birth rate during the past decade of birth rate decline (from 2006–2015); and concentrating on items related to women's sexual partnerships and birth histories will provide essential data to delve into the relationship contexts of births in the U.S.

Due to confidentiality concerns, the NSFG does not pose sensitive questions about identifying the sexual partner associated with each of their pregnancies. However, prior research has established the practice of joining respondents' sexual partner and pregnancy histories in order to attach the likelihood of biological fatherhood to the respondents' sexual partners in each instance of pregnancy (Bird et al., 2000).

By comparing relationship timelines with conception and birth events, it is possible to assign values to each sexual partner that represent the probability that he was involved with the pregnancy in question.

Answering the proposed research questions requires a two-step analytical process: in the first step, the **description of several indicators of relationship context** (such as type, duration, order, etc.) for women who experienced a birth will provide essential information about sexual partnerships across age groups; and in the second step, **the construction of a multi-state life table** will reveal how much time women who experience births spend in various types of relationships. Multi-state life tables expose the duration of multiple states; in this case, deploying a multi-state life table will provide an overview of the duration of competing states (being single; cohabiting; married; etc.) for women before, during, and after pregnancy and birth.

Preliminary Results

Preliminary descriptive statistics are presented in Tables 1–3. Table 1 shows the weighted percentages of the female NSFG sample who have ever experienced fertility and marital events and reveals a few notable trends for both survey waves. First, a higher percentage of teens have had sex and cohabited than have ever experienced a live birth or marriage. Second, for the 30–34 age group, a higher percentage of women have experienced a live birth than have ever cohabited or ever married. Third, respondents aged 40–44 have married at higher rates than they have cohabited. These results confirm that proportions of women who experience fertility and marital events differ across age groups, but also reveal that transitions between events are likely to vary, as well.

Table 2 presents weighted estimates of respondents who have had recent sexual partners within the twelve months prior to interview. Women who are younger than 30 more frequently report two or three sexual partners than women 30 and older. Relationship durations indicate the establishment of long-term sexual partnerships. Respondents who have experienced a live birth in both survey waves report second and third recent sexual partners than those who have not. These findings highlight differences in sexual partnerships across the reproductive years.

According to Table 3, rates of partnership types vary by age. Younger women are single at conception at a higher rate than older women. While the percentage of women who are single declines between conception and birth, the percentage of cohabiting women remains static; this might suggest that a greater share of single women at conception who are not single at birth are more likely to enter marriage than a non-marital cohabiting relationship. As for status changes, women who are younger move between states during pregnancy (e.g., from cohabiting to being married) more frequently than older women. Overall, a sizeable proportion of respondents will see their relationship status change in the course of their pregnancy.

Future Analyses (Completed Draft)

The preliminary results display differential trends in fertility, sexual partnership, and relationship status. Nevertheless, further inquiry is required for a more complete explanation. Additional analyses to be included in the completed paper are: a) a description of common orders of birth events and informal marital states; and b) the aforementioned multi-state life table analysis, which will yield estimated probabilities of the likelihood of transitioning between relationship states by age, and average times spent in competing relationship states (see Figure 1A–B for a visualization of the competing states to be analyzed).

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Table 1. Percentages of respondents who have ever experienced sex, live birth, cohabitation, marriage, or divorce or separation.

	% Ever Had Sex	% Ever Experienced a Live Birth	% Ever Cohabited	% Ever Married	% Ever Divorced or Separated
2008					
All respondents	86.6	55.6	52.0	53.3	11.3
Age groups					
15–19	43.3	6.7	10.2	1.1	0.0
20–24	86.2	29.7	44.2	21.7	4.1
25–29	95.8	54.9	64.4	54.3	9.7
30–34	97.8	76.7	69.7	73.5	13.9
35–39	98.7	82.9	64.2	83.2	17.6
40–44	98.9	84.6	61.0	87.3	22.5
Respondents who have experienced a live birth	—	—	68.3	77.8	17.2
Age groups					
15–19	—	—	59.5	13.2	0.0
20–24	—	—	72.3	38.9	9.9
25–29	—	—	76.9	66.6	13.8
30–34	—	—	72.1	79.9	15.5
35–39	—	—	66.4	89.0	18.5
40–44	—	—	61.0	91.0	23.1
2013					
All respondents	87.5	54.9	56.6	49.5	11.0
Age groups					
15–19	43.0	3.7	7.7	1.0	0.0
20–24	86.4	29.2	45.9	16.0	2.4
25–29	96.0	52.1	69.5	48.6	8.7
30–34	97.7	76.2	71.9	68.0	14.9
35–39	98.9	80.0	70.4	76.3	16.9
40–44	99.2	85.0	70.6	84.3	22.4
Respondents who have experienced a live birth	—	—	74.3	73.8	17.3
Age groups					
15–19	—	—	55.5	7.3	0.0
20–24	—	—	78.6	30.9	6.4
25–29	—	—	80.5	60.5	13.1
30–34	—	—	74.4	77.4	17.0
35–39	—	—	72.5	82.6	18.8
40–44	—	—	71.3	88.6	23.2

Note: Percentages for all female respondents using 4-year survey weights. 2008 represents the midpoint of the 2006–2010 NSFG; 2013 represents the midpoint of the 2011–2015 NSFG. Source: NSFG 2006–2010, 2011–2013, and 2013–2015 (NCHS, CDC: https://www.cdc.gov/nchs/nsfg/index.htm).

Table 2. Percentages of respondents who have had up to three sexual partners in the past twelve months and mean durations of sexual relationships.

	Most recent partner[a]		Second most recent partner[b]		Third most recent partner[c]	
	%	m[d]	%	m[d]	%	m[d]
2008						
All respondents	77.2	1.2	9.7	1.3	3.6	1.1
Age groups						
15–19	41.9	0.8	14.2	0.4	6.5	0.5
20–24	84.1	2.2	18.8	1.0	7.0	0.7
25–29	94.4	4.5	13.0	2.0	5.0	0.9
30–34	96.5	7.3	6.8	2.8	2.8	1.4
35–39	96.7	10.8	5.2	2.7	1.3	2.9
40–44	96.5	13.3	4.8	3.2	1.2	3.4
Respondents who have experienced a live birth	94.0	2.1	7.1	2.6	2.2	1.7
Age groups						
15–19	79.6	1.6	25.8	0.7	8.2	1.3
20–24	92.1	3.0	14.4	1.2	4.4	1.0
25–29	95.1	5.4	11.3	2.5	3.6	0.9
30–34	94.3	8.0	6.4	2.8	2.7	1.6
35–39	95.2	11.3	4.3	2.8	1.0	2.1
40–44	93.5	13.9	3.8	3.9	0.9	4.2
2013						
All respondents	85.5	1.6	10.6	1.2	4.0	1.3
Age groups						
15–19	42.4	0.5	12.2	0.3	5.5	0.3
20–24	84.7	1.7	19.2	0.9	7.9	1.0
25–29	93.6	3.8	10.9	1.8	4.3	1.4
30–34	96.0	6.8	9.8	2.3	3.0	2.3
35–39	95.8	8.8	5.7	4.2	1.3	3.2
40–44	97.1	11.9	5.4	3.7	1.7	3.2
Respondents who have experienced a live birth	97.6	3.2	7.9	1.9	2.5	2.3
Age groups						
15–19	89.8	1.0	21.0	0.3	11.7	0.5
20–24	97.0	2.8	17.9	1.2	5.7	1.3
25–29	97.6	4.8	9.9	2.4	3.5	2.0
30–34	98.4	7.7	8.0	3.0	2.5	3.0
35–39	97.0	9.9	5.1	3.7	0.9	4.1
40–44	98.0	13.0	5.1	3.5	1.7	3.4

Note: Percentages for all female respondents using 4-year survey weights. 2008 represents the midpoint of the 2006–2010 NSFG; 2013 represents the midpoint of the 2011–2015 NSFG. a. Most recent partner includes most recent or last sexual partner within the twelve months prior to interview or current sexual partner. b. Second reported sexual partner within the twelve months prior to interview. c. Third reported sexual partner within the twelve months prior to interview. d. Mean number of years between first and last instances of sex. Source: NSFG 2006–2010, 2011–2013, and 2013–2015 (NCHS, CDC: https://www.cdc.gov/nchs/nsfg/index.htm).

Table 3. Informal marital status at first birth.

	Conception[a]				Birth[b]				Status change[c]
	Single[e], %	Cohabiting, %	Married, %	Divorced[f], %	Single[e], %	Cohabiting, %	Married, %	Divorced[f], %	%
2008									
All respondents[d]	34.0	21.9	43.2	0.9	23.6	21.9	53.1	1.4	18.7
Age groups									
15–19	77.8	19.9	2.3	0.0	57.7	36.2	6.1	0.0	24.9
20–24	51.7	34.1	14.0	0.2	38.3	37.8	21.8	2.1	24.5
25–29	41.5	32.7	25.2	0.6	29.5	33.8	36.1	0.7	21.3
30–34	30.9	24.4	44.0	0.8	21.1	25.4	52.7	0.9	19.2
35–39	29.1	16.9	53.0	1.0	19.6	16.4	62.7	1.3	16.3
40–44	26.8	13.9	57.8	1.5	17.9	10.5	69.6	2.1	16.3
2013									
All respondents[d]	33.7	24.9	40.0	1.3	24.0	25.8	48.6	1.6	18.3
Age groups									
15–19	76.4	21.6	1.9	0.0	59.2	38.2	2.5	0.0	25.8
20–24	51.2	35.6	12.6	0.6	40.0	41.1	18.5	0.4	20.9
25–29	39.1	34.8	25.2	0.9	26.6	39.0	33.2	1.2	20.7
30–34	29.9	25.2	44.1	0.8	20.6	25.3	52.4	1.7	18.0
35–39	32.9	20.4	45.5	1.2	25.2	20.0	53.4	1.4	15.3
40–44	27.0	19.0	51.6	2.4	17.7	17.4	62.6	2.3	18.5

Note: Percentages for all female respondents using 4-year survey weights. 2008 represents the midpoint of the 2006–2010 NSFG; 2013 represents the midpoint of the 2011–2015 NSFG. a. Conception refers to each respondent's informal marital status at the beginning of their first pregnancy that resulted in a live birth. b. Birth refers to each respondent's informal marital status at the end of their first pregnancy that resulted in a live birth. c. The percentage of respondents whose informal marital status changed between the beginning and end of their first pregnancy that resulted in a live birth. d. All respondents who have ever experienced a pregnancy that resulted in a live birth. e. Single includes those respondents who report being never married and not cohabiting. f. Divorced includes separated and widowed. Source: NSFG 2006–2010, 2011–2013, and 2013–2015 (NCHS, CDC: https://www.cdc.gov/nchs/nsfg/index.htm).

Figure 1A. Competing states visualization for multi-state life table analysis (single status as start; excludes pregnancy; date of interview as absorbing state).

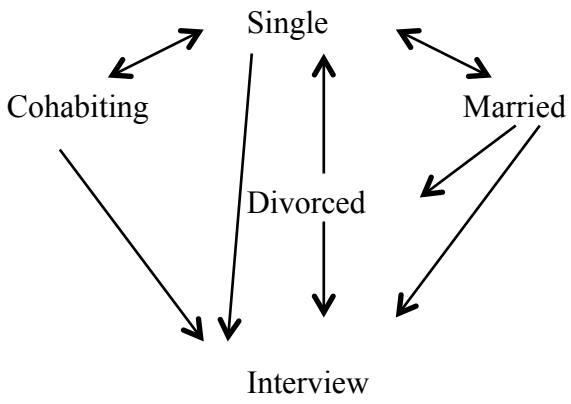

Figure 1B. Competing states visualization for multi-state life table analysis (includes pregnancy as the absorbing state).