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New Approaches to Measuring Multipartnered Fertility Over the Life Course
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ABSTRACT

Background: Scholarly work on multipartnered fertility (also known as MPF) has relied on samples and measurement techniques that provide only a partial view of this emerging family form. New research is needed which considers adults who have completed their childbearing and have final MPF statuses—allowing for more accurate assessments of prevalence and a better understanding of the variety of pathways adults may take into MPF over the life course.

Objective: This paper explores new data and measurement techniques for assessing multipartnered fertility with the intention of moving focus away from a dichotomous view of having children with more than one person towards an understanding of MPF salience, timing, and duration. Care is taken to address ongoing problems with measuring multipartnered fertility, including identifying unique birth partners, assessing nonresident fathers, and estimating missing cohabitation and marriage dates.

Methods: The National Longitudinal Survey of Youth 1979-2010 women’s sample is used for this example. Women were eligible for inclusion if they were alive at the final survey, were consistently assessed by NLS, and missed fewer than five waves of data collection, N= 3,962.

Conclusions: By utilizing the proposed methods researchers will be able to measure MPF in broader and more dimensional ways and provide nationally representative estimates of multipartnered fertility prevalence, number of birth partners, start dates, duration, and the timing of the MPF experience relative to other key events. This data also provides researchers with the opportunity to link MPF histories with women’s and children’s self-reported wellbeing over time.
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1. Introduction

Multipartnered fertility (also known as multiple-partner fertility or “MPF”) occurs when adults have children with more than one person. Research on the topic is relatively new but has begun to establish itself as an important way to consider the intersection between childbearing and family instability, especially among poor and minority families. Findings suggest that having children with more than one person may negatively affect the well-being of individuals and families (Klerman 2007), largely because MPF is correlated with economic, psychological, and social deprivations throughout the life course (Bronte-Tinkew et al. 2009; Guzzo and Furstenberg 2007a; Guzzo and Furstenberg 2007b; Carlson and Furstenberg 2006; Harknett and Knabb 2007; Logan et al. 2006; Manlove et al. 2008; Turney and Carlson 2012).

Unfortunately, the current approach to sampling and measuring MPF may provide flawed estimates and interpretations of this family form, requiring new methods to consider alternate age ranges and new specifications of the MPF experience.

In terms of sampling, the burgeoning research on MPF has generally relied on data from men and women early in their childbearing career\(^1\), with little work done on samples of adults who have finished having children and therefore have finalized their MPF status. The focus on a younger age range is problematic for developing a well-rounded understanding of MPF because adults remain at risk of having children with more than one person as long as they are of childbearing age and have the potential to partner with someone new. As a result, the most common sampling strategy is also one that is likely to suppress the actual prevalence of MPF in

\(^1\) Research using representative samples have focused on AddHealth to assess MPF among young women aged 19-25 (Guzzo and Furstenberg 2007a); the Fragile Families and Child Well Being survey to measure multipartnered fertility among relatively young, urban couples (Carlson and Furstenberg 2006, Harknett and Knabb 2007, Klerman 2007, Sinkewicz and Garfinkel 2009, Turney and Carlson 2012); and the NSFG to identify multipartnered fertility among men aged 18-45 (Bronte-Tinkew et al. 2009; Guzzo and Furstenberg 2007b; Logan et al. 2006; Manlove et al. 2008).
the population and to underestimate the propensity for an individual to achieve this status during their lifetime. Furthermore, the estimation of MPF among samples of younger adults may lead to other inaccuracies that obscure our substantive understanding of this family form. For example, research has consistently demonstrated that MPF is most common among those with early, especially teen, and nonmarital births. By constraining our analytic samples to younger ages we may be conflating the situations surrounding early births with MPF. When women who have completed their fertility are considered we may find patterns of on-time and later births associated with having children with more than one person, as well as a growing occurrence of MPF within first and higher order marriages that may lead us to expand our view of the relevant pathways into multipartnered fertility.

In addition to considering new samples for assessing MPF, this paper also explores a variety of ways in which we might conceptualize and measure multipartnered fertility that go beyond the commonly used dichotomous measure of MPF status (1 indicates a person has had a child with more than one person, 0 indicates all children are born to the same person), to include items intended to capture the salience, timing, and duration of the MPF experience. By improving our measurement of this family form we will be better able to capture how and why it is significant for families, the conditions in which it matters most (or least), and potential changes over time in the populations at risk for having children with more than one person.

The objective of this paper is to document new data and measurement techniques that will allow scholars to expand the current research agenda to include women who have completed their childbearing and have finalized MPF histories. This will be done by providing step-by-step instructions of how multipartnered fertility may be constructed in a publically-available, nationally representative, and longitudinal sample. As well as provide documentation to create a
variety of MPF measures intended to capture the importance and prevalence of this family form over the lifecourse.

1.2 Background

Before a data set could be chosen for studying MPF, it was important to identify the full range of measures one intends to capture. As such, the first objective was to assess how MPF is constructed in prior research, and to determine whether this adequately reflects the issues and key dimensions of this family form (Carmine and Zellers 1979). To this end, all JSTOR articles with the phrases “multipartnered fertility” and “multiple partner fertility” were reviewed to identify how the item is currently being measured, what it may be lacking, and the components that should be included in a robust coding schema. Because the topic is relatively new, only about a dozen articles emerged in this search, each conceptualizing multipartnered fertility as a dichotomous item indicating whether an individual had children with more than one person.

For some studies, the MPF dichotomy was based on the lifetime status of the individual (have you ever had children with more than one person?) or lifetime status of the couple (have you or your partner ever had children with more than one person?). This was particularly common in research using large-scale nationally representative samples of men (NSFG), women (Add Health), and couples (Fragile Families). An alternate approach to measuring MPF was to consider the current state of the individual. For women this was most often done by identifying two or more minors in the home who were born to two or more fathers. For men this was frequently based on the father’s financial responsibility for two or more minors across households. The measurement of MPF as a current state was typically used in studies based on state-level administrative records (Cancian and Meyer 2012; Monte 2011), although it has also
been applied to the nationally representative SIPP data when the sample is limited to households with at least one resident child (Evenhouse & Reilly 2011).

In addition to the dichotomous measure of multipartnered fertility, some studies also considered aspects of MPF salience, such as the number of birth partners (Carlson & Furstenberg 2006) or the duration of the MPF experience (Monte 2011). Though these measures were not found in most studies of multipartnered fertility, they were helpful in conceptualizing MPF more broadly and will be incorporated as key components of the current project.

To further inform the question of dimensionality, a literature review of seven family journals was conducted on the quantitative assessment of family instability between 2000 and 2010. Research over this period represented a broad spectrum of approaches for assessing family instability and complexity and led to the further development of a coding schema which included items such as the start date of MPF, the duration of time adults and children experienced both active (current) and passive (status) forms of multipartnered fertility, as well as items indicating the timing of the family experience relative to other developmental stages or events such as the mother’s age, family formations and dissolutions, and the birth of other children. Pains were also made in these studies to account for the characteristics surrounding children’s births which may influence later stability and the likelihood of family forms such as MPF, such as the mother’s age, relationship, and residential status at each birth.

1.3 Sample

To capture the wide range of potential measures uncovered in the literature review process it was necessary to find a data set which allowed for the harmonization of women’s prospective

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relationship and childbearing histories throughout adulthood. Further, to provide nationally representative estimates of MPF it was important to identify a data set that was large-scale, quantifiable, nationally representative, and had ongoing assessments of family formations, dissolutions, and fertility.

On every count, the *National Longitudinal Survey of Youth* (NLSY79) appears to be an ideal candidate for measuring multipartnered fertility. Surprisingly, the data have been generally unused for the study of MPF\(^3\), though they are an excellent choice because of their distinctive characteristics, such as the ability to identify individual partners in households, assess residential fathers, determine the genetic relatedness of siblings, and provide completed fertility histories for women. Furthermore, the sample is nationally representative and has been assessed 24 times over a 31 year period, capturing in its design the unstable, dynamic, and complex realities of American families over the life course.

Beginning in 1979, the NLSY followed the 1957-1964 birth cohort from their late teens to their mid-fifties, assessing key indicators of family life and fertility every year until 1994, and biennially thereafter. Over this time, many of the respondents left their childhood homes, went to college, started a career, cohabited with partners, got married, and had children of their own, making this an ideal sample in which to study the pathways and correlates of family forming behaviors. Furthermore, the NLSY Child and Young Adult surveys follow the biological children of NLSY mothers every year from 1986 to present, allowing researchers to link the MPF experiences in the mother’s generation with the child’s well-being in childhood and during the transition to adulthood. Because men can continue to be at risk for MPF beyond the women’s standard age of fecundity, and men’s biological children were not surveyed with the NLSY-C or NLSY-YA samples, the coding examples presented here will focus on women.

\(^3\) An exception to this statement is an unpublished dissertation on this topic using NLSY79 data (Dorius, 2010).
At the time of the 2010 data collection, the women in the sample were in their late-forties to mid-fifties and had completed their expected childbearing, and by extension, had aged out of risk for new multipartnered fertility experiences. The sample used for this project includes the original 6,282 women from the cross-sectional and supplemental samples, with military and economically disadvantaged respondents excluded because of lack of consistent assessment by NLS (n=1,347). Other ineligible respondents include those who died before the final survey (n=213) or missed at least five waves of data collection (n=760), making it difficult to reliably evaluate relationships over time. The final sample includes 3,962 eligible women, and is composed of roughly 63% from the cross-sectional sample and 37% from the minority oversample.

2 Coding schema

Because population trends are leading to more “complexity of family life and a more ambiguous and fluid set of categories than demographers are accustomed to measuring” it was important that the approach to coding multipartnered fertility was responsive to changes in family life over the past 30 years, as well as changes in survey assessment over this time (Cherlin 2010: 403). One of the strategies used to increase the reliability of the data harmonization was to triangulate information from women’s self reports at each survey wave with other sources of information, including the Household Roster for each wave and the updated Fertility and Relationship History file created by NLS in 2004 and refreshed each wave to include cross-round assessments of cumulative relationship and childbearing experiences.

At each survey round participants reported whether they were currently in a residential relationship as well as provided information on relationship type (marriage, cohabitation, single),
up to three changes in relationship status that occurred since the prior survey (divorce, move out, marriage, move in), and start and end dates of each relationship (coded as century months). Since 1990, the NLSY79 has included a series of additional cohabitation questions about whether the participant cohabited before marriage—including a retrospective report of cohabitation prior to their current marriage. In later survey years the respondent was also asked if the cohabiting relationship was continuous, if a cohabiting partner was present at the time of the survey, whether there was a gap of singlehood in the past year in which cohabitation could occur, the month the cohabitation began and ended, and the number of cohabitations during the past year.

A key advantage to using the *Fertility File* and *Household Roster* is the provision of two constructed variables that allow researchers to identify individual men who live in the household: a unique partner ID number for every residential partner, and the identification of early cohabiting nonmarital partnerships where men were identified as living in the household, but for which no cohabitation data was collected prior to 1990. Because each of the mother’s partners were given a unique ID number which was maintained for every year the man was present in the household, it is possible to know if the same man was moving in and out of the household, if the same man fathered multiple children, the total amount of time women lived with particular men, and the relationships in which children were fathered and raised. These variables can also be used along with other relationship and childbearing information to create a father ID for each birth partner. For example, if a man was in a residential relationship with the mother at the time of a child’s birth, he was estimated to be the child’s father, and was assigned a father ID that matched the partner ID provided by NLS for that particular relationship. In all, the 3,962 eligible women in this sample had given birth to 8,282 children. Of these children, 78% were linked to their mother’s residential partners at the time of birth. This coding strategy allows for the
quantifying of several characteristics surrounding each birth, including the mother’s relationship to the father (e.g. marital, cohabiting, or separated), the residential status of the father (resident or nonresident) and the marital status of the birth (marital or nonmarital). It is also possible to link the majority of the children (n=6,460) to specific residential relationships, with corollary information on the biological mother’s and father’s relationship start date, end date, duration, and type. The remaining 22% of children (n=1,822) were also coded relative to the relationship characteristics at the time of birth (nonresident father, nonmarital birth, and single mother) though they were not linked to any particular father or relationship because the mother was not living with a partner at that time.4

Using the father ID and childbearing and residential histories it is possible to create several preliminary MPF variables, including (1) a dichotomous measure of lifetime status indicating whether the mother has ever had children with more than one person, (2) a dichotomous measure of current status for every year from 1979-2010, (3) a measure of the total number of fertility partners, (4) a start date of MPF, (5) the duration of MPF, and (6) measures of MPF timing relative to other important life events and developmental stages.

2.1 Dealing with missing data

Although the information provided by NLSY79 is excellent on many counts, there are issues with missing or conflicting data that need to be addressed before relationship histories could be reliably constructed. For the majority of women in this sample (72%), imputation of missing data was not necessary, because marriages were normative and information was available regarding the start and end dates of all residential relationships. For slightly over a

4 Of the children who did not have fathers identified, 86% were born prior to their mothers ever living with a residential partner.
quarter of the women, there was missing information or inconsistent reports regarding when relationships began or ended. Most often, the error was due to nonresponse, and occurred when a partner was reported as living in the home in the *Household Roster* but for whom the woman supplied no additional information during the main survey. The greater part of these cases were related to cohabiting relationships that were not directly asked about until the 1991 survey, making the majority of nonresponse due to error in data collection from 1979-1990. Looking beyond the early years, the most common pattern of nonresponse from 1991-to present also surrounded the measurement of cohabitation, but occurred when women chose not to provide information about their live-in partner (identified in the *Household Roster*) even though a battery of cohabitation questions were asked directly during the main interview.

The underreporting of cohabitation experiences is not surprising, and upholds the notion that nonresponse, rather than response error, may be a common feature of surveys of relationship status (Mitchell, 2010), that cohabitation is often underreported in national surveys (Manning & Smock 2005), and that cohabitation is particularly complicated to measure since about 15% of couples have part-time cohabitation experiences that make it difficult to determine whether it is, or is not, occurring at the time of interview (Knab 2005). Furthermore, even when relationship statuses are more formal, such as marriages or divorces, nonresponse error regarding the dates of each transition is not infrequent (Mitchell 2010), as found among a small portion of these women.

As a result of this missing or conflicting information, an imputation procedure was developed to mimic the algorithms used in the NLSY 1997 data collection effort, making the two cohorts of surveys comparable in their response of missing values. The guiding principles for estimating missing dates were to be consistent and logical when imputing. For example, when a
woman reported several start dates for the same relationship, the most consistently reported date is used. Likewise, when two start dates were given but one occurred before the end of the prior relationship, the most logical date (e.g. the one that didn't conflict with other valid information) was incorporated. Finally, when one had to estimate a start or end date with no information other than the relationship was occurring at the time of a particular interview, NLS used a series of decision rules for estimating missing start and end dates (see Table 1 Estimation Notes for more details).

Taken as a whole, the amount of information estimated with help from the algorithm only affected a minority of women in the sample. However, slightly over one quarter of the respondents (28%) had one or more dates estimated with the NLSY97 imputation algorithm. Of the women who did have a start or end date estimated, 40% had one date estimated, 33% had two dates estimated, and 27% had three or more dates estimated, with the majority of estimated dates being start and/or end dates for cohabitations that occurred prior to 1990, when reporting of cohabitation was not directly assessed.

### 2.2 Example of preliminary coding

Table 1 depicts the process used to code women’s MPF histories with the NLSY79. The top section contains information provided in the Fertility File and Household Roster and the lower half displays the variables constructed for this project. As noted in the row for Relationship Trajectories, the woman in this example experienced four distinct relationships with three different men over a ten year period. In the columns for 1980 and 1981 one can see the woman’s relationship type (Rel Type) was reported as single, and the Partner ID of 0 indicates that she has never had a residential partner up until this point in her life. This is fairly common given that
many of the young women in the sample still lived with their parents at the time of the 1979 survey.

As women left their childhood homes in the early and mid 1980s, the number and frequency of residential partners increased. In this example, the woman reported her first residential partner, with whom she cohabited, in 1982 (row = Rel Type). Prior to 1990, the interviewees were not directly questioned about these partnerships, so the start dates for cohabitation must be estimated. Although it is not optimal to use estimated dates in establishing relationship histories, the NLSY79 has advantages over most nationally representative longitudinal samples in determining cohabiting relationships because: (1) for the vast majority of dates that need to be estimated, the dates are within a 12 month range between waves of data collection so the error in durations of relationships is minimal, and (2) the NLSY has gone back and reviewed the household rosters to identify similar-age opposite-sex partners for the years in which direct questions about cohabitation were not asked, leading to better coverage of cohabitation events than other surveys conducted over this same period.

Using the imputation algorithm described in the notes for Table 1, the missing date is estimated as January of the known year (century month 985, see Appendix Table A for a listing of all relevant century months). As is the standard procedure, NLS gave the woman’s first partner an ID of 1, and her second an ID of 2, and so forth. In 1983 there was a change in the woman’s relationship status (row=Change 1) when she married the man who had been cohabiting with (the consistent Partner ID indicates the marriage is to the same man reported in the cohabitation). This marriage lasted until 1985 when the woman divorced (row= Rel Type). The actual start and end dates for the marriage and cohabitation are reported in the century
month change row (CM Ch 1) as 996 and 1019. In 1987, 1988, and 1989 the woman reported new cohabiting partners in the home (row=Rel Type).

The Partner ID row indicates that this included two men, neither of whom were her first husband. Using the NLS decision rules for imputing values for missing dates, the start and end dates for the cohabitations were estimated. In all, this woman had a rather complex relationship trajectory for this decade, which spanned 4 relationships, 3 partners, 5 relationship formations, and 4 relationship dissolutions (row= Instability Measures).

To create measures of multipartnered fertility one can compare the timing of births with relationship events to identify whether MPF occurred, when it began and ended, and the number of unique birth fathers. Going back to the example, there were two children born during this ten year period (row= Fertility Info). Child 1 was born in 997 into relationship one, a cohabitation → marriage → divorce which started in 986 and ended in 1019. The father ID for this child is 1. Recall the father ID matches the partner ID for relationships concurrent with births. At the time of the first child’s birth, the father was living in the home (residential status), married to the mother (relationship status), and the child’s birth was in wedlock (birth status). Child 2 was born in 1049 into relationship two, a cohabitation estimated to last from century month 1045 to 1056. Based on these estimated dates, the father was given an ID of 25. At the time of birth, the father was living in the home and cohabiting with the woman. The child was born out-of-wedlock.

Because the two children were born to separate fathers, the mother is coded as having a lifetime status of multipartnered fertility (MPF=1). The current state of MPF is set equal to 1 for each of the years in which the minors lived in the home, from the birth of the second child to the exit or 18th birthday of the first child. In this case, from century month 1049 (child two’s birth)

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5 Note that whenever the ID of birth fathers was based on estimated relationship dates, flags were created to indicate the father ID information was also estimated for use in sensitivity analysis.
Table 1. Depiction of Initial Coding Approach to Multipartnered Fertility Among NLSY79 Women, 1980-89 Inclusive.

Information Provide by NLS:

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<tbody>
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<td>975</td>
<td>987</td>
<td>998</td>
<td>1010</td>
<td>1023</td>
<td>1035</td>
<td>1047</td>
<td>1066</td>
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<tr>
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<td></td>
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<td>Child2: 1049</td>
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</tbody>
</table>

Information Coded for this Project:

- **Relationship Trajectory**: Cohab to partner 1 (est985) → Marriage (996) → Divorce (1019) → Cohab to partner 2 (est1045) → Cohab End (est1056) → Cohab to partner 3 (1057) → Cohab End (1068) → Cohab reunite partner 2 (1069) → Cohab End (est1080)

- **Dad ID & Birth Characteristics**: Child 1 was born in 997 into relationship 1. Dad ID=1. At the time of birth, the dad was living in the home and married to the women (in wedlock). Child 2 was born in 1049 into relationship 2. Dad ID=2. At the time of birth, the dad was living in the home and cohabiting to the women (out of wedlock).

- **Measures of MPF**: Two children were born to two separate fathers. The mother was coded as having a lifetime multipartnered fertility status of 1 (yes MPF), a current state equal to one for the years 1988 and 1989 (plus years 1990-2001 when both children were minors in the home), the number of partners was 2, and the MPF start date was 1049 (birth date of second child).

Notes: Blanks in any cell indicate a missing response or valid skip. Dates are in century months (CM). Rel Type: Relationship code of current spouse or partner. Part ID: ID of current or most recent (if they moved out) spouse or partner. [0] Never reported spouse or partner, 1 =1st spouse/partner, 2=2nd spouse/partner, etc. Change: Was there a change in marital status since the last interview? [1=yes, 0=no] CM Ch 1: CM of the change in marital status since last interview. Fertility Info: Number of children, century month of each child’s birth. Data: NLSY79 Women 1980-1989, extracted 3/12/2012 from www.nslinfo.org/investigator. Estimation Notes: Following the NLSY97 imputation algorithm, if a woman was missing the start date (year and month) for marriage or cohabitation, the value is estimated to be one month after the date of the last recorded interview. If the year was known but not the month, January of the known year was assigned as the start month. If the woman was missing end dates (year and month) for marriage or cohabitation the month and year were imputed to be 1 month prior to the current interview. If the year was known, December of the known year was assigned as the imputed value. If start and end dates were missing for separation or divorce, the month and year were imputed to the month of the current interview. If the year was known and the month was missing, December of the known year was assigned as the imputed start date for the separation or divorce.
to 1213 (child one’s 18th birthday). The number of birth partners the women had over this time was two (father ID 1 and father ID 2). And, the start date for MPF was 1049 (the birth date of the second child). This MPF start date can be used to identify the pattern of relationships that came before MPF began (cohabitation, marriage, divorce, cohabitation) and after it occurred (cohabitation end, cohabitation, cohabitation end, cohabitation, cohabitation end). This information can also be used to assess instability both before (3 formations, 1 dissolution), and after the onset of MPF (2 formations, 3 dissolutions). Further, one can create measures to reflect the relative timing of the MPF experience in regards to other key stages or events such as the woman or her partner’s age, or the birth and timing of children.

2.3 Assessing reliability and validity

Though there appears to be reasonable surface validity regarding the coding schema and dimensionality of the items described above, it was important to find points of comparison that could be used to assess the reliability and validity of this approach (Carmine and Zellers 1979). To this end, a criterion data set was identified which allowed for the comparison of this residentially-based assessment of multipartnered fertility with an assessment of sibling relatedness created with the same data by Dr. Joseph Rodgers (half-siblings share a biological mother and have a different birth father, resulting in MPF). Unlike the current approach, Rodger’s established his measure of biological relatedness by (1) comparing weight and height trajectories of sibling pairs (e.g. genetic research suggests that extreme outliers cannot be full siblings), and (2) utilizing mother’s reports of whether each child’s father was in the household, lived different distances from home, or had different death dates, and (3) using adolescent reports

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6 The NLSY79 kinship links were provided for use on this project by Dr. Joseph Rodgers, Department of Psychology, University of Oklahoma. Others who wish to use the NLSY kinship links can obtain copies by writing Dr. Rodgers at jdroders@ou.edu.
of biological relatedness (e.g. children 15 years and older were asked whether they shared a biological father with each of their siblings).

The residential-based assessment of women’s lifetime MPF status (1=yes based on coding schema described previously) was then compared with Roger’s sibling pair data. In Roger’s data woman were coded as having multipartnered fertility (MPF=1) if any of their biological children were half-siblings, indicated by having a genetic heritability coefficient of .25 among any sibling pair that shared a biological mother. Women were coded as not having MPF (MPF=0) if all of the women’s biological children were full siblings and had a sibling-pair genetic heritability coefficient of .5 or greater.

There was over 98% agreement between the two multipartnered fertility measures, suggesting that the residentially based estimates of MPF has reasonable content validity, and the estimated prevalence among this sample is in line with comparable measures, even when estimated with alternate coding techniques. As seen in Table 3, of the 3,188 women for whom there was information available for both measures, there was consistency of report for 3,120 women (98% agreement). In the 68 cases where the two measured differed, the sibling pair data was slightly more likely to indicate MPF than the estimates generated with the women’s residential relationship histories. This was in line with one of the a priori goals of this project to be conservative when estimating dates and father IDs in order to provide the most accurate estimates possible.

3. Refining measures of MPF to account for nonmarital fertility

Based on these comparisons, it appears the residential based measures are a valid assessment of the biological relatedness of men, women, and children in NLSY families. Notwithstanding this
positive result, there remains a serious limitation to the current approach. Specifically, a problem of missing data remains for women whose multipartnered fertility status could not be assessed with the residential-based measures used in the first round of coding.

Because the NLSY79 only collects information on residential unions, it is difficult to identify nonresident birth partners who contribute to a women’s MPF status by looking at relationship histories alone (Guzzo and Furstenberg 2007a). Further, because a common feature of MPF relationships is nonmarital childbearing (Logan et al 2006), ignoring this issue might significantly impact the accuracy of the data and underestimate the prevalence of MPF in this sample. In response to these concerns, several solutions for refining the coding schema can be incorporated which correct for missing data due to nonmarital fertility by expanding the measurement of MPF to go beyond the residential assessment used in the first round of coding.

3.1 Refining MPF status and state

As noted previously, one of the most common measures of multipartnered fertility is a dichotomous item of lifetime status indicating whether an adult has ever had at least two children by two separate partners. For about a third of the eligible respondents in the NLSY79 this is quite easy to assess because women with fewer than two children can be automatically coded as having ‘no possible MPF’. The remaining two-thirds of the women—those with two or more children—have the potential for either ‘single partner fertility’ or ‘multipartnered fertility’.

Among women with the potential for MPF, a three-prong coding strategy produces a measure of MPF for all eligible NLSY79 women. First, one can triangulate available data regarding women’s MPF by comparing (a) the residential assessment of MPF described in the original coding process, which links men to particular relationships in order to assess father IDs.
and identify unique birth partners, (b) the genetic assessment of MPF provided by Rodgers which assess each sibling pair to determine genetic variability within families, and can be used to refine concerns over missing start dates, and (c) the adolescent report of biological relatedness asked in relation to every sibling in the home (this was assessed for the first time in the 2006 NLSY79-YA survey of children 15 years of age and older). When a child reported that they and any other sibling did not share the same biological father, the mother was coded as having multipartnered fertility. By triangulating all known data (indicating there were no conflicts between any of the three reports, although one or more might have been missing) one is able to establish multipartnered fertility estimates for 2,490 women or 92% of the unknown cases.

Second, if there were conflicts between any of the three measures, the most common report was used, resulting in the identification of an additional 81 women, or 3% of the unknown cases.

Third, if there were conflicting reports and only two measures (due to missing items), one must order their preference for coding. I suggest drawing first from the residential assessment, then the mother’s report of genetic similarity, then the child report. 7 If none of these measures are available (n=5), one can either drop the few remaining cases or estimate MPF as likely or unlikely (likely=1 if the woman had a least one new partner or remained single for two or more years between nonresidential births). Using the second approach multipartnered fertility can be assessed for every women in the NLSY sample, including all women with nonresidential birth histories, which is a significant improvement over samples created with other residentially-based surveys. A visual depiction of this process and its results is presented in Figure 1.

---

7 As noted earlier, the residential and genetic assessments of MPF were similar 98% of the time. Conversely, the child report was similar to both the residential and genetic assessment only about 90% of the time. While this is still a sizable overlap, the child report may show less agreement with the mother’s reports due to boundary ambiguity in complex families (Brown and Manning 2009). Due to these differences, the child reports are used only when the other information is unavailable.
Table 2. Comparison of the Residential-Based Coding Approach to Genetic Estimates of Multipartnered fertility among NLSY79 Women. N=3,188 for cases where information was provided for both estimation techniques.

<table>
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<tr>
<th>Genetic Estimate (Rodgers)</th>
<th>SPF</th>
<th>MPF</th>
<th>0 Children</th>
<th>1 Child</th>
<th>TOTAL</th>
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<td>Multipartnered fertility (MPF)</td>
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<td>0 Children</td>
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<td>0</td>
<td>648</td>
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<td>1583</td>
<td>345</td>
<td>612</td>
<td>648</td>
<td>3188</td>
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</table>

Source 1: NLSY 1979-2010 women’s data extracted from https://www.nlsinfo.org/investigator. Women were eligible for inclusion if they were alive in 2010, missed fewer than five waves of data collection, and were consistently assessed by NLS. Source 2: NLSY kinship link data file. This can be obtained by written request to jrodgers@ou.edu.
New Approaches to Measuring Multipartnered Fertility Over the Life Course

Figure 1. Flowchart for Creating a Refined Measure of Multipartnered Fertility Status with the NLSY79. Unweighted Frequencies Reported.

Source: NLSY 1979-2010 women’s data extracted from https://www.nlsinfo.org/investigator. Women were eligible for inclusion if they were alive in 2010, missed fewer than five waves of data collection, and were consistently assessed by NLS. N=3,962. Note: Date are unweighted. Weighted distributions of maternal MPF indicate prevalence rates of 17% for no children, 16% for one child, 49% for single partner fertility, and 19% for multipartnered fertility.
3.2 Refining the number of birth partners

A second approach to measuring multipartnered fertility deals with the salience of the event in a woman’s life by focusing on the number of birth partners reported throughout adulthood. For most women this can be created by tabulating the dichotomous measure of lifetime status with the cross-round measure of number of children. In doing so, the number of birth partners can be coded as ‘0’ for childless women, ‘1’ for single partner fertility women, and ‘2’ for MPF women with only two children. Using this approach, 84% of the women in the sample were accounted for without additional coding. To assess the remaining 622 cases (16% of sample), in which the woman had multipartnered fertility and three or more children, a three stage process was applied to identify birth partners, a particularly difficult task for families with nonresidential fathers.

First, when most or all of the birth fathers were known (e.g. the mother was in a residential relationship with known men at the time of each birth), the residential estimate of ‘number of birth partners’ equaled the number of unique father IDs assessed in the first round of coding. This step was used to identify one-third of the unknown cases, or about 211 additional women.

Second, if fathers could not be identified because they were not living with the mother at the time of birth, the mother’s report of sibling relatedness was used to determine the number of birth fathers. This was based on data created for each sibling dyad from mother reports, which asked, for each child, whether (a) the father was in the home, (b) how far away the nonresident father lived, and (c) the father’s death date. If the mother provided consistent information on each sibling pair (e.g. in a family with 3 children there are 3 sibling pairs including children 1&2, 1&3, and 2&3), the information was used to determine whether the children shared a father. Because all of the cases included women with multipartnered fertility, the links were used to
assess whether they shared two or three or more fathers by hand-coding each of the sibling pairs within the family unit. Note that there were less than a dozen cases with four or more birth fathers, so women with more than three birth partners were combined into a 3+ category at this stage in the coding process. Using this systematic approach, one can determine the number of birth partners for 180 additional women, or about 29% of the unknown cases. See Figure 2 for an example of this coding approach.

Finally, if the fathers remain unknown because of their nonresidential status at the time of birth and the mother report was missing or inconsistent, the child report of sibling relatedness can be used to assess common parentage. This should be drawn upon as a last resort because it is only asked of adolescent children from 2006 onwards compared with the data used in the first two steps which spans over twenty waves of data collection and included multiple reports. Because of missing values among the ‘hard cases’ that remained, this approach only provides information on 50 women, or about 8% of the unknown sample. After going through each of these steps, 181 women with multipartnered fertility and 3 or more children were still undetermined. Because they represent an important piece of the MPF story, it was not optimal to drop these cases. Nor did it seem appropriate to impute a value without more information. As a compromise, these MPF women were coded as ‘uncertain’ and given a number of partner score of 2.5 indicating that there was information confirming at least two birth partners, but that it was inconclusive or inconsistent as to whether there were 3 or more birth partners8. See Figure 3 for a detailed overview of this coding process.

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8 The creation of a undecided category with a value of 2.5 was made based on the coding work done by Rodgers. When assessing sibling relatedness, Rogers gives values according to full (.5) and half (.25) sibling status. When the genetic relatedness is unknown, genetic coefficients for siblings are assessed as half the value of the two possible groups (.375). In statistical analysis, those in the undecided category behave as would be expected of a group comprised of equal parts of half and full siblings. Given that MPF is a proxy for genetic relatedness among siblings
Figure 2. Establishing Number of Fathers by Utilizing Sibling Pair Information.

**Example 1.** The woman has three children. Children 1 and 2 are full siblings, children 1 and 3 are half siblings, and children 2 and 3 are half siblings. The woman is identified as having two possible birth partners.

**Example 2.** The woman has four children. Child 1 is a half sibling with all other children (sibling links 1x2, 1x3, 1x4). Children 2, 3, and 4 are full siblings (sibling links 2x3, 2x4, 3x4). The woman is identified as having two possible birth partners.

and that women have a confined range of between at least two and three or more partners, a similar approach of coding the undecided groups with a value halfway in-between the two possibilities.
Figure 3. Flowchart for Assessing Number of Birth Partners with the NLSY79

Source: NLSY 1979-2010 women’s data extracted from https://www.nlsinfo.org/investigator. Women were eligible for inclusion if they were alive in 2010, missed fewer than five waves of data collection, and were consistently assessed by NLS. N=3,962. Note: Date are unweighted. Weighted distributions of number of birth partners indicate prevalence rates of 17% for zero fathers, 65% for one father, 14% for two fathers, 3% for estimated 2.5 fathers, and 2% for three or more fathers.
## Table 3. Translation Table for Assessing Start Dates and Durations of Multipartnered Fertility with the NLSY79

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<th>Duration: Current State</th>
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<table>
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<tr>
<th>One Partner</th>
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<th>Duration: Lifetime Status</th>
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<tbody>
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<td>child 2 18th birthday- start date</td>
<td>last survey-start date</td>
</tr>
</tbody>
</table>
3.3 Refining MPF start, duration, and timing

Once the individual birth fathers are identified, it is possible to create a range of variables regarding the duration and timing of MPF state and status. To do this, it is first necessary to create a **MPF start date**. Consider Figure 4 which provides an example of coding for women with up to three birth fathers and four children. The start date can be identified for the majority of these women with very little coding, as long as you know the birthdates of children and can identify unique fathers (noted as father IDs in the second column, with “1,2” indicating the birth partner order of father one followed by father two). Women with less than two birth partners—those with single partner fertility, one child, or no children—should be coded as valid skips, while those with two or more partners should be given a start date equal to the birth date of their first child to a new partner. For those with only two children, this equals the second child’s birth date. For MPF mothers with three or more children and an unknown number of partners, the start date can be made equal to the birth date of the first child born to the second known partner (see Monte 2011 for an example of this approach).

The measure of MPF start is the key to assessing the **duration of lifetime MPF status**, which equals the date of the final survey minus the start date. It is also critical for assessing the **duration of the current MPF state**. To do this, one must identify the amount of time the mother has two or more minor children in the home who share different biological fathers. For most women this can be assessed as the number of months between the MPF start date and the exit from the home or 18th birth date of the youngest child born to the first partner. In the case of women with more than two birth partners, the MPF state duration equals the number of months between the start of MPF and the exit from the home or 18th birth date of the youngest child born to the second-to-last father.
Further building on the start date, researchers can create measures of the relative timing of MPF and key family events to expand our theoretical and substantive understanding of how and why MPF may influence the relationship between having children with more than one person and wellbeing. For example, the *timing of MPF relative to women’s age* can be identified as a series of items indicating whether MPF began when the woman was in her late teens to early twenties, mid-to-late twenties, early-to-mid thirties, mid-to-late thirties, or forty or older.

Similarly, the start date of MPF can be compared to the start and end dates of relationships to ascertain the *timing of MPF relative to women’s relationship instability*. To do this one could determine whether MPF began after one relationship dissolution (or two formations), two relationship dissolutions (or three formations), or three or more relationship dissolutions (or four or more formations). Using this approach would help shed light on whether MPF is more or less influential depending on when it occurs relative to the experience of family instability.

One can also assess the *timing of MPF relative to the birth of children* by identifying those born before and after MPF began. This may have substantive importance because children born prior to MPF are almost universally exposed to time in a single parent home between the break up from partner one and the formation of a relationship with partner two.

### 3.4 Limitations

Along with the measurement limitations described previously (e.g. assuming fathers are the partners in the home at the time of birth and identifying multipartnered fertility among women with non-residential relationships), there is an additional concern that is not as easily addressed
with the proposed methods. Specifically, by opting to use a sample of older women in order to create more accurate lifetime prevalence rates of MPF, one is also selecting to study a group that may or may not have comparable experiences with younger cohorts. Current research indicates that the likelihood of having children with more than one partner is increasing over time, largely because younger cohorts are transitioning to new-partner births “more quickly and at a higher rate than older cohorts” (Guzzo and Furstenberg 2007b: 583), which suggests that the future of family life may increasingly be composed of parents who engage in multipartnered fertility, and that younger cohorts may have higher prevalence rates by the time they complete their childbearing compared with the mother’s assessed here. Even though this limitation does not discount research on MPF among the middle-age birth cohort, it does suggest that the prevalence which is noted for this group may under-represent lifetime rates for younger cohorts of women. As these cohorts age we will be better able to test this hypotheses.

4. Conclusions

To date, most of the scholarly work on multipartnered fertility has utilized samples and measurement techniques that provide only a partial view of this emerging family form. New research is needed which considers samples of adults who have completed their childbearing and have final MPF statuses—allowing for more accurate assessments of MPF prevalence and a better understanding of the variety of pathways adults may take into this family form over the life course. Along with exploring new samples, future research would benefit from moving away from dichotomous views of multipartnered fertility as a lifetime status or current state to include more dimensional appraisals of the topic, which might consider the salience, timing, or duration of the MPF experience.
The focus of this research is to demonstrate a new approach for measuring multipartnered fertility among a sample of women who have finished having children. By providing detailed instructions on how to utilize prospective data from the *National Longitudinal Survey of Youth 1979* women’s files, the household roster, and sibling-pair information, it is possible to construct a variety of MPF measures over three decades, including MPF lifetime status, MPF current state for each year, number of birth partners, MPF start dates, the duration of the MPF experience as a state or status, and the timing of MPF relative to other developmental stages or significant life events. Importantly, this approach allows researchers to address the key concerns plaguing MPF work among many samples, including strategies for dealing with missing cohabitation dates, identifying unique birth fathers, and accounting for nonresidential partners at the time of birth. Taken together, the data and techniques suggested here may provide a new avenue for research on the intersection of childbearing and family instability which may expand our understanding of the prevalence and correlates of multipartnered fertility among a national sample of women.

Further, because this new approach to studying multipartnered fertility has been developed for use with an ongoing, multigenerational sample, it is possible to link women’s MPF experiences with their own, as well as her child’s, well-being over time. This rich data resource has the potential to provide new understandings of the intergenerational transmission of partnering and childbearing behavior on the mental and physical health of the next generation, and may provide important new avenues to future research.
### Appendix A. Century Months for the NLSY79 Surveys

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*Note: The table represents the survey months for the NLSY79 surveys.*
References


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