Together Forever? Relationship Dynamics and Maternal Investments in Children's Health

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Abstract
Using Fragile Families and Child Wellbeing Data (N=4,871), this paper examines why relationship status matters for prenatal health behaviors. The paper argues that a mother's potential investments in her child's health are conditioned by socioeconomic and interpersonal resources, including the quality of her relationship with the child's father. Results show that several relationship dynamics measures, including multiple partner fertility, physical abuse, and relationship conflict, predict poor prenatal health behaviors above and beyond confounding factors. In addition, these relationship dynamics explain some of the advantage in prenatal health behaviors married mothers have over unmarried mothers (those who are cohabiting, dating, or have broken up with the father of the baby by the time of the birth).

Introduction

Current research on the relationship between family structure and children's outcomes primarily emphasizes developmental and physical health outcomes. An important determinant of those outcomes is maternal prenatal health behaviors. A mother's decisions about health behaviors while a child is in utero can have effects in terms of birth outcomes and throughout a child's life (Barker, 1994; Conter, Cortinovis, Rogari, & Riva, 1995; Napiorkowski et al., 1996; Sood et al., 2001). Thus, the determinants of prenatal health behaviors for mothers should also be considered determinants of children's early health and development. Understanding the determinants of children's health disparities, given the close relationship between health early in life and later (Hass, 2007; Hayward & Gorman, 2004), may give insight into disparities in health over the lifecourse.

Recent work has documented the relationship between marital status and a variety of health behaviors (Umberson, 1992; Umberson, Williams, Powers, Liu, & Needham, 2006; Waite, 1995). Married mothers' children tend to have better birth outcomes, and married mothers have better pre- and postnatal health behaviors, such as not smoking and choosing to breastfeed (Kiernan & Pickett, 2006; Raatikainen, Heiskanen, & Heinonen, 2005). Beyond marital status itself, research demonstrates that expectant mothers living with their partners have more adequate prenatal care and better health behaviors (Albrecht, Miller, & Clarke, 1994; Kiernan & Pickett, 2006; Luo, Wilkins, & Kramer, 2004; McIntosh, Roumayah, & Bottoms, 1995; Raatikainen et al., 2005) and their babies have healthier birth weights (Padilla & Reichman, 2001). It is unknown what characteristics of these partner relationships may be influential for maternal health behaviors. Why might associations between relationship status and prenatal health behaviors persist, after adjusting for socioeconomic and other confounding factors? This paper seeks to answer this question by building a theory of relationship dynamics and maternal investments in children's health. Thus, this paper tests whether measures of relationship dynamics, independent of relationship status, are associated with prenatal health behaviors. It also examines

differences in prenatal health behaviors by relationship status for women who are married to, cohabiting with, dating, or broken-up with the father of their baby. In this way, the paper tests for the effects of relationship dynamics across subjective (mother reports of relationship characteristics) and objective (relationship status) measures. Then, it tests whether differences in prenatal health behaviors by relationship status are mediated by the relationship dynamics measures. Thus, this paper examines both the *independent contribution* of relationship dynamics measures to prenatal health behaviors and the *relative contribution* of relationship dynamics measures to differences in prenatal health behaviors among relationship status categories, after SES and other confounding factors have been taken into account.

Background

Prior research has documented the relationship between marital quality and health (Marcenes & Sheiham, 1992; Wickrama, Lorenz, Conger, & Jr., 1997; Williams, 2003). This work goes beyond showing a relationship between marriage and better health outcomes, and focuses on the aspects of the relationship that might contribute to health. The predominant theme in the literature is that marriage can be either a positive or negative influence on health, depending on the strength of the romantic relationship. Good relationships offer resources and promote resilience; poor relationships confer stress and strain. Less is known, however, about how marital quality may impact health *behaviors*, particularly for pregnant women. Most of the literature relating mother-father relationship characteristics to prenatal health behaviors focuses on marital status (married or unmarried) alone. Late prenatal care is associated with the absence of the father in the household (Albrecht et al., 1994). Additionally, women in strained relationships may experience more stress, and pregnant women who report more stress also report more substance abuse (Jesse & Reed, 2004; Ludman, McBride, Nelson, Curry, Grothaus, Lando et al., 2000; McCormick et al., 1990; Oyemade et al., 1994). Unmarried women report more substance abuse during pregnancy than married women (MacDonald, Peacock, & Anderson, 1992). Expectant fathers also influence health behaviors after the birth of the child,

particularly by encouraging breastfeeding (Jasso, Massey, Rosenzweig, & Smith, 2004; Wiemann, DuBois, & Berenson, 1998; Wolfberg et al., 2004). These studies indicate that the presence of a partner (particularly a husband) during pregnancy may be beneficial for a woman's prenatal health behaviors.

Despite the beneficial impact that the presence of partners can have on behaviors, partners may also be a cause of stress, depending on the quality of the relationship. The relationship between relationship status, quality, and mothers' child-related health behaviors is complex. Married relationships are not automatically of better quality than cohabiting or other romantic relationships, although married people tend to score higher on relationship quality and satisfaction measures than long-term cohabiters (Brown & Booth, 1996; Skinner, Bahr, Crane, & Call, 2002). As over one-third of all U.S. children are now born to unmarried mothers (National Center for Health Statistics2005), and up to two-fifths of children may live at some time in their lives in cohabiting unions (Bumpass & Lu, 2000), studies of familial influences on health that account for modern family structures are essential. Moreover, because few differences have been found for health and health behaviors for married versus cohabiting couples (Chia et al., 1994), focusing on marital status distinctions seems less important for children's health outcomes than the relationship's quality and its other characteristics. Subjective assessments of a relationship may be more related to health or health behaviors than marital status alone (Wickrama et al., 1997). However, most of the literature finds that married couples are most satisfied with their romantic relationships, compared to cohabiting and other couples (Brown & Booth, 1996; Skinner et al., 2002). Thus, comparing both subjective and objective measures of relationship status and quality is necessary.

Getting prenatal care is recognized as one of the most important things a pregnant woman can do to increase the likelihood of a healthy baby, and nearly 85% of U.S. women today have their first prenatal visit in the first trimester (National Center for Health Statistics, 2005). Additionally, smoking and drinking during pregnancy are widely known to affect the fetus in adverse ways, and most mothers

know they should avoid substance abuse while pregnant (Lewallen, 2004). Although these factors are well-understood throughout society, some pregnant women still make poor health behaviors choices. This paper argues that mothers may view good prenatal health behaviors as investments in their children's health that will not mature until well down the road. Many prenatal health behaviors do not have tangible risks until the baby is born, or even afterwards. This complicates the picture as mothers must weigh the pros and cons of the behaviors against unknown and distant outcomes.

Of course, a woman's ability to make "investments" in her future child's health is constrained by her level of resources, including socioeconomic, social, and emotional resources. Women with substance-abuse problems before pregnancy are likely to have a hard time quitting before or during pregnancy, especially if they lack the resources to help. Women in difficult, strained relationships may have a harder time finding the time and energy to get to the prenatal health care clinic in the first trimester, especially if the partner is not supportive of the pregnancy. Thus, this paper argues that a variety of resources are important and necessary for mothers to make appropriate investments in their baby's future health.

A mother's decisions about investments in her children's future health may be intricately linked to how stable and good the mother perceives her relationship with the father of the baby to be. If a child is conceptualized as a symbol of a romantic union, mothers may choose to invest more or less in those children depending on how they feel about the union. Pregnant women who believe the father of their baby is and will continue to be an integral part of her familial unit might make healthier choices for her baby than a woman who feels she cannot count on the father. Additionally, a mother who perceives the father is committed to her and to the baby may view the child as their joint undertaking. On the other hand, mothers who know they cannot count on the father of the baby may be more likely to invest *more*, since they know the child is starting out behind. This is not to say that a mother will neglect her children based on how she feels about the father. Rather, she may make or withhold small and incremental investments throughout the prenatal period that together may influence a child's

healthy development. Moreover, the level and intensity of these investments are closely linked to the resources a mother can draw upon.

Prenatal Health Behaviors as Maternal Investments

The concept of health behaviors as investments in future health is not new. Economic theory predicts that people are more likely to make investments when they believe the future benefits outweigh the current costs. Additionally, individuals who believe they will reap benefits over longer periods of time in the future have more incentive to invest (Becker, 1975). Thus, individuals may make health behavior decisions based on whether the cost of the behavior (the investment) is outweighed by potential risks; and how long they expect to collect returns on the investment (Fuchs, 1982; Grossman, 1972). Maternal health behaviors are an especially clear case of health behaviors as investments because (1) a mother's prenatal health behaviors directly affect her child's future health and (2) the exact effects of the behaviors are distant and uncertain. While the risks of poor prenatal health behaviors at the population level are known and understood by most mothers, the perceived risk of any one behavior to an individual mother may be quite low. Thus, her decisions about health behaviors while pregnant may be conditioned by her general tendency to consider the future when evaluating choices. This paper argues that this propensity to consider the future when making current decisions is partly conditioned by a mother's romantic relationship status and quality. If children are partly conceptualized as a good jointly created and sustained by their parents, how the mother feels about the father and her perceptions of how committed he is to their relationship may influence her health behavior decisions. The major caveat to the theory as presented thus far is that a mother's "decisions" about investments are certainly conditioned by the amount of resources available to her. Thus, viewing prenatal health behaviors as investments must be tempered by the lens of the quantity and quality of socioeconomic, social, and emotional resources. A mother with many resources upon which to draw (including from the father of the baby) will be better able to "choose" to make good

health investments. A mother with fewer resources will have a harder time making good health investments.

The greater access to resources afforded by higher socioeconomic status influences both the propensity for a mother to be in a committed, stable relationship and the likelihood of positive prenatal behaviors. Mothers with more resources are less likely to experience hardships that would strain their romantic relationships, or to enter into partnerships with unstable partners. Mothers with more resources will also have more opportunities to make investments in their children. Typically, married mothers have more resources than unmarried mothers (Duncan & Hoffman, 1985; Hill, 1992; Smock, Manning, & Gupta, 1999). However, it is unclear how relationship status, relationship commitment and quality, and SES interact. Although the availability of resources can certainly contribute to good relationship quality, being poor does not preclude one from enjoying a meaningful, committed relationship. Nor does being wealthy automatically confer a privileged romantic relationship quality. Similarly, although clearly marriage symbolizes a firm commitment to a romantic relationship, we cannot assume that all married couples enjoy good relationship quality compared to cohabiting, dating, or broken up couples. Thus, studies that address health and health behaviors solely on the basis of marital status without considering the context of the relationship overlook important distinctions that may be drawn both between and within relationship categories (Williams, 2003).

The analysis examines the following competing hypotheses:

Hypothesis 1: Regardless of relationship status, mothers with high levels of relationship quality and commitment will evidence better prenatal health behaviors.

After accounting for socioeconomic status (resources), mothers in stable and loving relationships may be able to invest the most in their child's future health. On the other hand, mothers who have broken up with the father of the baby may also have great incentive to invest, despite typically lower levels of resources, given that they know they cannot count on the father in the future, and that their child may be the person they will depend on in the future. In addition, mothers who have broken up with the

father during pregnancy may have alleviated some of the stress and strain that might restrict their availability to invest in the health of their baby. However, we expect that given the lower levels of resources likely to be experienced by these women, they are unlikely to be able to invest at the levels of mothers still involved with the father of the baby.

Hypothesis 2A: Relationship quality and commitment measures will explain differences in prenatal health behaviors by relationship status, after accounting for differences in socioeconomic status.

Given our expectations about the association between relationship status and quality and commitment, and our expectations about the association between relationship quality, commitment, and prenatal health behaviors, we expect unmarried mothers (cohabiting, dating, and broken up) to have poorer health behaviors compared to married mothers; but that these differences (after accounting for socioeconomic status) will be largely due to relationship dynamics measures.

Hypothesis 2B: If relationship dynamics are closely linked to the availability of socioeconomic resources, they will not explain the differences in prenatal health behaviors by relationship status.

If the differences in prenatal health behaviors by relationship status are entirely due to differences in socioeconomic resources between the groups, the relationship dynamics measures will not have any of the difference by relationship status left to explain.

Data and Measures

The data for this analysis come from the Fragile Families and Child Wellbeing Study, a new United States study that follows a birth cohort of new, mostly unwed parents and their children over a five year period. The baseline sample, collected between 1998 and 2000, contains information on 3,712 births to unmarried parents and 1,188 births to married parents, in 20 U.S. cities with

populations of over 200,000.[1] The study aims to provide information on the resources and relationships of new parents and how these factors affect their children. The study selected cities based on a random sample, stratified by policy and labor market conditions, of all U.S. cities with populations greater than 200,000. Next, to draw a random sample of births, either all hospitals in a city were selected for interviews or, if there were too many, a random sample of hospitals was chosen. Finally, random samples of both marital and non-marital births were selected to reach pre-set quotas, based on the number of both kinds of births at each hospital in 1997. All baseline interviews were completed in-person, as were approximately one-quarter of the one-year follow-up interviews (the remainder were completed over the phone). The mothers' first interviews took place within 48 hours of the birth while they were still in the hospital. Fathers were interviewed either in the hospital or elsewhere, a short time later. Follow-up interviews were conducted at one year, three years, and five years. In addition to sociodemographic and attitudinal information for both mothers and fathers, the data contain information on whether or not children were ever breastfed, and for how long they were breastfed. This paper uses data from both the baseline and one-year surveys. The response rate for the one-year follow-up was 90% for mothers. Cases where the father of the baby was unknown (N=23) were dropped, for a final total of 4,871 mothers.

All data for this paper come from the baseline survey of mothers (measured just after the birth) with the exception of the multiple partner fertility variable, which comes from the one-year survey of mothers, and represents the mother's report of the father's children with other women. It is possible that the father's number of children with other mothers may have changed since the birth of the couple's baby together, in which case estimates of the effect of multiple partner fertility on the

[1] The 20 cities are Oakland, CA; San Jose, CA; Jacksonville, FL; Chicago, IL; Indianapolis, IN; Boston, MA; Baltimore, MD; Detroit, MI; Newark, NJ; New York, NY; Toledo, OH; Philadelphia, PA; Pittsburgh, PA; Nashville, TN; Austin, TX; Corpus Christi, TX; San Antonio, TX; Norfolk, VA; Richmond, VA; and Milwaukee, WI.

mother's prenatal health behaviors will be biased. However, given the short time frame between the baseline and one-year surveys, we do not feel this is a significant concern.

The dependent variables of interest are a set of three prenatal health behaviors, and then a summed scale of the three prenatal health behaviors. Each is measured as an ordinal variable, with the responses ranging from 0 (least problematic) to 2 (most problematic), and from 0-3 for the scale of prenatal health behaviors, with a 1 indicating the respondent had one poor prenatal health behavior, and a 3 would indicate that the respondent had all three poor prenatal health behaviors. The first outcome measure is a measure of which trimester of her pregnancy the mother received her first prenatal care. Mothers were asked in what month of their pregnancies they first visited the doctor, and responses were coded from 0 (first visit in her first trimester) to 2 (first visit in her third trimester). The next outcome is whether mothers smoked while pregnant. Mothers were asked: "During your pregnancy, did you smoke 2 or more packs per day, 1 or more but less than 2, one pack or less per day, or never?" The responses were scored from 0 (never smoked during pregnancy) to 2 (smoked 1 pack or more per day). For alcohol use during pregnancy, mothers were asked: "During your pregnancy, how often did you drink alcoholic beverages? Nearly every day, several times a week, several times a month, less than once a month, or never?" The responses were scored from 0 (never drank during pregnancy) to 2 (drank several times per month or more). Missing responses for the dependent variables were dropped from the models for that analysis (late prenatal care, 45 cases missing (<1%), smoked during pregnancy, 11 cases misses (<.05%), drank during pregnancy, 12 cases missing (<.05%), prenatal health behaviors scale, 61 cases missing (<1.5%)).

A mother's relationship status at the time of the baby's birth was ascertained with a series of questions, beginning with whether the mother was married or not. If she answered no, she was shown a card with a series of statements about the relationship, such as "We are romantically involved on a steady basis," and "We are just friends." All mothers who reported living with the father are classified as "cohabiting." Mothers romantically involved with the father of the baby but not living together are

classified as "dating," and mothers who were not romantically involved with the father are classified as "broken up." The mothers' relationship dynamics are measured with five measures. First, for all mothers, relationship duration is measured as the number of years the mother knew the father before getting pregnant. A shorter duration before the pregnancy could indicate a lower level of commitment to the relationship from either partner. The next relationship dynamics variable is whether the father has children with other mothers. Multiple partner fertility reflects probable social, romantic, or financial commitments the father has to other families, which may lessen his commitment to his current relationship (Harknett & Knab, 2006; Mincy, 2002). Next, mothers were asked whether the father had a drug or alcohol problem that interfered with his work or friendships, which is included as an indicator variable in the models. The relationship conflict scale is created from 10 items which ascertain the frequency of both negative and positive relationship dynamics. Mothers were asked how often the couple disagreed about money, sex, spending time together, the pregnancy, and alcohol and drug use, and also how often the father was fair and willing to compromise, offered support and encouragement, insulted or criticized, and showed affection. The responses were summed into a scale (α=0.72) from 0 (no conflict) to 20 (very high conflict). A very few mothers (<0.5%) were involved with a new partner at the time of the baby's birth. The questions about the relationship measures for these mothers, as well as for those who are no longer romantically involved with the father of the baby, ask the mother to recall what her relationship with the father was like when they were together. Finally, if the mother reported her partner ever hitting her, she was coded as reporting physical abuse.

Missing data for any of the relationship status and quality measures never exceeded 3% of the cases and rarely exceeded 1%. I experimented with several ways of handling missing data, and the results were robust to various methods. Missing data for the independent variables are imputed based on the mean of the measure for each relationship subgroup (i.e., for married mothers, or cohabiting mothers), and a dummy variable indicating the variable is missing is included in the model. In addition, controls for demographic and background factors are included in the models, including

relationship status with the father (married, cohabiting, romantic, or broken-up), race/ethnicity (white, black, Hispanic, or other), nativity status (an immigrant indicator), maternal education (categories for less than high school, high school degree or GED, and some college or more), whether she lived with both biological parents age at 14 (indicator variable), household poverty status categories (from <50% of poverty line to 300%+), mother's age (continuous), the number of the mother's other biological children, and whether the mother was covered by private health insurance at the time of the birth. Unfortunately there is no data on whether the birth was intended. To attempt to address the problem that relationship status and prenatal health behaviors are likely both linked to birth intendedness, an indicator for whether the mother thought about having an abortion is included in the models. It should be noted that as the sample includes only new parents, all mothers in the sample were motivated enough to bring the pregnancy to term. This automatically selects out mothers who miscarried or had an abortion, who may be mothers experiencing the most relationship conflict and with the fewest resources. Finally, a set of mother-reported background characteristics for the father of the baby are also included in the models. Controls include an indicator for whether the father worked in the week before the birth, the father's age (continuous), and indicators for whether he completed high school or at least some college. Including this wide range of control measures, especially the abortion measure, imposes a stringent test on whether the relationship dynamics measures influence prenatal health behaviors.

Methods

The hypotheses are tested with a series of ordinal logistic regression models for each outcome of interest. First, the effects of the relationship dynamics measures are individually assessed for each health outcome, net of demographic and background controls. In this series of models, we assess the extent of the influence of each relationship dynamics measure on maternal prenatal health behaviors. In a second series of models, the effect of relationship status (married, cohabiting, romantic, or broken-up) on each health outcome is assessed, alone and then with controls for demographic and background

characteristics. Next, the relationship dynamics measures are included in the models. In this set of models, we assess how the inclusion of sociodemographic and the relationship dynamics measures change the associations between relationship status and health behaviors. In all models, standard errors are adjusted for clustering of cases at the city-level.

Results

Table 1 shows descriptive statistics for the entire sample and is also broken down into by relationship status (married, cohabiting, dating, or broken-up), beginning with the overall prevalence of each health behavior. Mean scores for the outcomes are presented in the tables. In terms of sample proportions for the behaviors (not shown), about 16% of mothers had their first prenatal care in the second trimester, and 4.5% in their third trimester. For smoking behavior, 17% of mothers reported some smoking, and 2.5% reported heavy smoking. For drinking, 8% reported some drinking, and 2.5% reported heavy drinking. In terms of the prenatal health behaviors scale, 28% of mothers reported one adverse behavior (prenatal care after the 1st trimester, smoking, or drinking), 8% reported two adverse behaviors, and 2% reported all three. Although all of these behaviors are self-reported, and may be underestimated, the figures are in line with national estimates (Beck et al., 2002). With the exception of reporting drinking during pregnancy, married mothers report much lower levels of worrisome behaviors than unmarried mothers, with cohabiting mothers and those in romantic relationships reporting similar (and higher) levels of worrisome behaviors, and mothers who have broken up with the father of the baby fare worst.

The sample is 21.1% white, 47.6% black, 27.3% Hispanic, and 4.0% other race/ethnicities, and 17.1% of the sample is foreign-born. Fully 34.7% of the sample did not complete high school, 35.1% completed at least some college, and the average household falls within 100-200% of the poverty line. The average mother was 25.3 years old at the time of the baby's birth, and has 1.2 children. About 32% of mothers reported that private health insurance helped pay for the birth at the hospital. In terms of family background, 43.4% of mothers lived with both biological parents at age 14. Fully 27.3% of

the mothers in the sample contemplated an abortion for the current birth. Married mothers are more likely to be white, foreign-born, older, to have completed at least some college, to report having private health insurance, and to fall in a higher poverty status category as compared to unmarried mothers. Next, the means for the father's characteristics are presented. Fathers were likely to be working the week before the birth (78.8%), and the average age in the sample is 28.0 years. Most of the fathers in the sample had completed high school (38.2%) or some college (32.5%), but nearly a third had not completed high school. Married fathers were more likely to be working in the week before the birth, to be older, and to have more education than unmarried fathers.

Next, the means for the relationship dynamics measures are presented. The mean relationship duration before the pregnancy is 4.7 years. Fully 37.5% of mothers are involved with fathers who have children with other mothers, and 5.5% of mothers report that the father of the baby has a drug or alcohol problem. The average score on the relationship conflict scale (0-20) is 4.1, and 3.9% of mothers report physical abuse by their partner. Married mothers are more likely to have been in their relationships longer, and less likely to have a partner who has children with other mothers and to report the father has a drug or alcohol problem or has physically abused her. Additionally, married mothers report the lowest levels of conflict in their relationships. Among unmarried mothers, as expected, cohabiting mothers fare best on the relationship dynamics measures, followed by mothers in romantic relationships with the fathers. Mothers who have broken up with the father of the baby, unsurprisingly, report the most adverse relationship conditions, with 16.1% reporting the father has a drug or alcohol problem and 11.5% reporting physical abuse.

Table 2 presents results of a series of ordinal logistic regression models for each health behavior outcome, with controls included in each model for all the mothers' and fathers' background characteristics. Each relationship dynamics measure is entered into the models separately to ascertain the independent effect of each on prenatal health behaviors. Thus, the models judge the independent

contribution of each measure to predicting each health behavior, but not their relative importance vis-à-vis each other.

The first set of relationship dynamics measures tested is relationship duration, which matters significantly for both smoking and drinking while pregnant. Each year the mother knew the father before becoming pregnant decreases the odds of drinking some or a lot, compared to not drinking, by 3%, and the odds of smoking some or a lot, compared to not smoking, by 3%. The father of the baby having children with other mothers is a powerful predictor of poor maternal health behaviors, increasing the odds of the mother smoking (some or a lot, compared to none) while pregnant by 43%, and increasing the odds of having 1, 2, or 3 adverse prenatal behaviors compared to none, by 20%. If the father has a drug or alcohol problem, mothers' odds of smoking (some or a lot, compared to none) are increased by 54%, and odds of drinking (some or a lot, compared to none) are increased by 93%, and the odds of more adverse prenatal behaviors are increased by 72%. Relationship conflict consistently predicts adverse prenatal health behaviors. Each one-point increase up the scale increases the odds of adverse behaviors by 3% (for late prenatal care), 8% (for smoking), 10% (for drinking) and 7% (for the prenatal health behaviors scale). Reported physical abuse by the partner is also a powerful predictor of poor prenatal health behaviors, increasing the odds of adverse behaviors by 135% (for smoking), 130% (for drinking), and 102% (for the prenatal health behaviors scale). Thus, we find support for the first hypothesis of this paper, that relationship dynamics measures would be associated with a mother's prenatal health behaviors, after accounting for confounding factors. Mothers with positive relationship dynamics, especially low levels of conflict and abuse, have lower odds of negative prenatal health behaviors. The strongest associations occur in the substance-abuse outcomes, and not for the prenatal care timing outcome. In addition, we find effects of relationship dynamics in an incremental fashion, such that more adverse relationship dynamics are associated with more adverse prenatal health behaviors.

Next, we turn to estimating the effects of relationship status on maternal health behaviors, and determining whether the relationship dynamics measures mediate those effects. Table 3 presents results from a series of ordinal logistic regressions for each health outcome. In the first four columns, all four relationship groups (married mothers, cohabiting mothers, mothers who do not live with the fathers but are in romantic relationships, and mothers who have broken up with the father by the time of the baby's birth) are compared for each outcome. For each outcome, Model 1 (M1) includes only the relationship status dummy variables. Model 2 (M2) adds the mothers' and fathers' background characteristics, and Model 3 (M3) adds the relationship dynamics measures.

Cohabiting mothers have more than twice the odds of having their first prenatal care in the third trimester (compared to in the first or second trimester) than married mothers (OR: 2.39), and mothers in romantic and broken-up relationships have over three times the odds of getting late prenatal care, compared to married mothers (OR: 3.12 and OR: 3.72, respectively). Controlling for background characteristics significantly reduces the coefficients for all categories, indicating that, depending on the relationship status category, between 49% and 72% of the difference between the relationship status categories in first seeking prenatal care late in pregnancy is attributable to differences in mothers' and fathers' background characteristics between the groups. Adding the relationship dynamics measures to the model does not significantly add to the model fit, or reduce the differences between relationship categories. Thus, most of the difference in the timing of prenatal care between married and unmarried mothers is accounted for by background characteristics, which is inconsistent with Hypothesis 2A, that relationship dynamics measures would mediate the relationship between relationship status and prenatal health behaviors, and consistent with Hypothesis 2B, that socioeconomic resources would account for the differences between relationship groups.

The differences between married mothers and those in other relationship types increase for having smoked during pregnancy. Compared to married mothers, cohabiting mothers and mothers in romantic relationships have more than 3.5 times the odds of having smoked (some, or a lot, compared

to none) during pregnancy, and mothers who have broken up have more than four times the odds. After adding the background characteristics measures in Model 2, the differences between married mothers and mothers in other types of relationships decrease significantly, but large differences remain, with all odds ratios at 2.4 or higher. Adding the relationship dynamics measures in Model 3 decreases the differences between married and all other mothers, by 14% for cohabiting mothers, 20% for mothers in romantic relationships, and 44% for broken-up mothers. Thus, 1/5th (for mothers in romantic relationships) and nearly half (for broken-up mothers) of the difference between married and other mothers' smoking during pregnancy is associated with differences in relationship dynamics, which is consistent with Hypothesis 2A that relationship dynamics would explain some of the differences between relationship groups.

The only significant difference in having drunk alcohol while pregnant emerges between married mothers and those who are broken up, with the latter having 59% higher odds of having used alcohol (some, or a lot, compared to none) while pregnant. Once background characteristics are added in Model 2, the effect of being broken-up on drinking during pregnancy decreases only a small amount (OR: 1.46). Adding the relationship dynamics measures in Model 3 almost eliminates the difference in drinking between married mothers and mothers who have broken-up (OR: 1.05). Thus, the findings for having drunk alcohol during pregnancy, although only for mothers who have broken-up with the father, are consistent with the findings for smoking as well as Hypothesis 2A.

In the last set of models, differences by relationship status in the prenatal health behaviors scale are shown. Compared to married mothers, cohabiting mothers have higher odds (of having 1, 2, or 3 adverse behaviors, compared to none) of poor prenatal health behaviors than married mothers (OR: 2.07), as do mothers in romantic relationships (OR: 2.44) and mothers who have broken up with the father (OR: 3.25). Including controls for background characteristics in the second model significantly reduces the coefficients for all groups, by between 37% and 43%. Adding the relationship dynamics measures to the model decreases the coefficients even more, by between 9% (for cohabiting mothers)

and 33% (for mothers who have broken up with the father). Thus, although a significant portion of the difference between married and unmarried mothers in the number of adverse prenatal health behaviors is due to differences between the groups in background characteristics, some of the difference is also due to differences in relationship dynamics between the groups, which supports Hypothesis 2A that these measures would mediate the association between relationship status and prenatal health behaviors.

Discussion

This paper finds support for the notion that a mother's relationship dynamics influence her prenatal health behavior decisions. Mothers who believe their relationships are strong and likely to last are more likely to make investments in their children's future, in terms of healthy maternal behavior choices. Particular characteristics of relationships for married and unmarried mothers that make those investments less likely are if the father of the baby has children with other mothers, if the mother's relationship experiences a large amount of strain or conflict, if the father has a drug or alcohol problem, or if the mother reports physical abuse. Additionally, increased relationship duration decreases the odds of some poor health behaviors.

Thus, the hypothesis that relationship dynamics measures would influence maternal health behaviors is upheld. The most important factors to prenatal health behaviors that we considered are whether the father has children with other mothers, relationship's level of conflict, if the father has a drug or alcohol problems, and if the mother reports physical abuse. It is important to note that socioeconomic status and other background characteristics influence these behaviors to a large degree, as well, but these findings remain even after controlling for such measures. In cases where the mother's partner has children with other women, the mother may have less motivation to make good health behavior choices because she knows his time, attention, and resources are going to be divided between her and his other family or families. Similarly, mothers in poor-quality, strained relationships may judge that the relationship is not going to last, and thus an investment now is unlikely to pay off in

the future. Alternatively, mothers in tenuous relationships may have less time, energy, and motivation to make good health behavior choices. These mothers may have less ability to judge that the future benefits of good health behaviors outweigh the current costs to follow through with them.

The hypothesis that relationship dynamics measures would mediate the relationship status differences in maternal health behaviors is partially upheld. For most of the health behaviors, adding the relationship dynamics measures to the models decreases the differences between married and unmarried mothers, although the differences are not entirely diminished, indicating that other factors are also involved in producing these differences. The relationship dynamics measures are most powerful in reducing the differences between married mothers and mothers who were dating or broken-up with the father of the baby, indicating that some of the differences in maternal health behaviors between these groups of mothers are due to differences in relationship dynamics. The relationship dynamics measures are less important in reducing the differences between married and unmarried mothers for the timing of prenatal care measure, which instead was largely predicted by sociodemographic measures. This finding could indicate that relationship dynamics are more powerful for predicting substance-use behaviors, such as smoking and drinking during pregnancy. This is consistent with work showing that substance abuse during pregnancy is often driven by stress (Ludman, McBride, Nelson, Curry, Grothaus, & Lando, 2000).

Overall, the paper demonstrates that disparities in prenatal health behaviors, and perhaps ultimately, children's health and developmental outcomes, are not only driven by differences in socioeconomic and demographic characteristics. Relationship status matters above and beyond these differences, and the mother's relationship dynamics also influence her health behavior decisions. Mothers in stable, committed relationships may be more likely to believe that their relationships will last, and may be more likely to make good health behavior decisions, because they believe that those investments will continue to pay off in the future. This paper adds to the literature on family structure

and children's health and development by demonstrating that a mother's perceptions of her relationship quality may influence her health behavior decisions.

The likelihood that a third factor is associated with both maternal health behaviors and relationship investment cannot be ruled out with the current study. For instance, mothers who plan for the future in general may be more likely to be in committed relationships and more likely to choose good health behaviors. Additionally, mothers with high self-esteem may be more likely to make good choices about both relationships and health behaviors, which could drive the relationship. Another potential factor is the degree to which the child was wanted—and unfortunately, the data do not allow consideration of this factor (beyond introducing the control for contemplating an abortion) that is important in predicting maternal health behaviors. Although these data do not contain the necessary measures to test those possibilities, this paper does control for a variety of other possible confounding sociodemographic factors and they do not explain the relationship between maternal health behaviors and relationship characteristics.

Table 1: Descriptive Statistics for Fragile Families Mothers, Total Sample, Married, Unmarried, and Relationship Categories within Unmarried

	All Mothers	*Married*	*Cohabiting*	*Romantic*	*Broken-Up*
	Mean (SD) or %				
Dependent Variables					
Late Prenatal Care (0-2)	0.25 (0.52)	0.12 (0.39)	0.25*** (0.52)	0.30*** (0.55)	0.37*** (0.63)
Smoked During Pregnancy (0-2)	0.22 (0.47)	0.09 (0.31)	0.25*** (0.50)	0.25*** (0.48)	0.30*** (0.54)
Drank During Pregnancy (0-2)	0.13 (0.40)	0.12 (0.37)	0.11 (0.37)	0.14# (0.42)	0.20*** (0.50)
Prenatal Health Behaviors Scale (0-3)	0.50 (0.73)	0.28 (0.52)	0.52*** (0.73)	0.59*** (0.79)	0.69*** (0.81)
Independent Variables					
Mother's Background Characteristics					
Race/Ethnicity					
(White)	21.1	41.9	18.2***	8.0***	16.1***
Black	47.6	25.0	44.5***	69.3***	55.3***
Hispanic	27.3	25.4	34.4***	20.1***	25.2
Other	4.0	7.5	2.9***	2.8***	2.9***
Mother is Foreign-born	17.1	27.3	17.8***	8.9***	12.1***
(Mother did not Complete High School)	34.7	16.6	39.9***	40.3***	41.7***
Mother Completed High School	30.2	20.1	33.5***	34.4***	31.6***
Mother Completed Some College +	35.1	63.3	26.6***	25.3***	26.7***
Poverty Categories (1-5)	3.1 (21.4)	4.0 (1.2)	2.9*** (1.3)	2.5*** (1.3)	2.6*** (1.3)
Mother's Age at Birth	25.3 (6.1)	29.3 (5.6)	24.3*** (5.5)	23.6*** (5.8)	23.9*** (5.5)
Mother's Parity	1.2 (1.4)	1.1 (1.2)	1.2# (1.3)	1.2 (1.5)	1.1 (1.5)
Mother Had Private Health Insurance for Birth	32.1	68.2	22.7***	18.3***	18.6***
Mother Lived with Both Biological Parents at Age 14	43.3	65.2	39.9***	32.1***	34.7***
Mother Contemplated Abortion	27.3	9.2	26.3***	38.2***	42.9***
Father's Background Characteristics					
Father Worked Week Before Birth	78.8	91.7	81.0***	69.8***	67.3***
Father's Age	28.0 (7.3)	31.7 (6.4)	27.1*** (6.8)	26.4*** (7.5)	26.9*** (7.6)
(Father did not Complete High School)	29.3	15.7	34.3***	32.6***	33.8***
Father Completed High School	38.2	23.7	36.8***	49.3***	47.0***
Father Completed Some College +	32.5	60.6	28.9***	18.1***	19.2***
Relationship Dynamics Measures					
Relationship Duration (Years)	4.7 (4.8)	7.5 (5.4)	4.0*** (4.2)	3.8*** (4.2)	3.0*** (4.1)
Father has Children with Other Mothers	37.5	17.9	36.1***	46.5***	60.3***
Dad has Drug/Alcohol Problem	5.5	2.3	3.8***	5.5***	16.1***
Relationship Conflict Scale (0-20)	4.1 (3.3)	2.8 (2.5)	3.7*** (3.0)	4.6*** (3.3)	6.8*** (3.7)
Mother Reports Physical Abuse	3.9	1.6	3.1*	3.6**	11.5***
Total N	4,871	1,187	1,784	1,274	626

Table 2: Ordinal Logistic Regression with Health Behavior Outcomes, Relationship Characteristics Entered Singly

Outcome	Late Prenatal Care *B (S.E. B)* (e^B)	Smoked While Preg.	Drank While Preg.	Prenatal Health Behaviors Scale
Relationship Duration (Years)	0.01 (0.01) (1.01)	-0.03* (0.01) (0.97)	-0.03* (0.01) (0.97)	-0.01 (0.01) (0.99)
Father has Children with Other Mothers	0.04 (0.09) (1.04)	0.36*** (0.07) (1.43)	0.03 (0.09) (1.03)	0.18** (0.06) (1.20)
Dad Drug/Alcohol Problem	0.24 (0.19) (1.27)	0.43** (0.16) (1.54)	0.66** (0.20) (1.93)	0.54** (0.17) (1.72)
Relationship Conflict Scale	0.03** (0.01) (1.03)	0.08*** (0.01) (1.08)	0.09*** (0.01) (1.10)	0.07*** (0.01) (1.07)
Mother Reports Physical Abuse	0.05 (0.17) (1.05)	0.82*** (0.17) (2.27)	0.83*** (0.16) (2.30)	0.71*** (0.16) (2.02)
N	4,716	4,745	4,744	4,701

Note: Controls are mother's background characteristics, parity, whether she has private health insurance, father's background characteristics, and whether the mother contemplated an abortion, and standard errors are adjusted for clustering at the city-level. e^B = exponentiated *B*. Prenatal Health Behaviors Scale scored from 0 for *no poor prenatal health behaviors* to 3 for *all three poor prenatal health behaviors* (smoking, drinking, and late prenatal care).
# p < .10; *p < .05; **p < .01; ***p < .001

Table 3: Ordinal Logistic Regression Results for Health Behavior Outcomes, Coefficients and Odds Ratios for Relationship Status

Outcome	*Model*		*B (S.E. B.)* (e^B)				
		Married	Cohabiting	Romantic	Broken Up	ρ	Psuedo R2
Late Prenatal Care	M1	--	0.87(.09)***	1.14(.11)***	1.31(.12)***	NA	0.024
		1.00	2.39	3.12	3.72		
	M2	--	0.24(.12)#	0.41(.17)*	0.67(.12)***	0.000	0.071
		1.00	1.27	1.50	1.95		
	M3	--	0.28(.14)*	0.45(.18)*	0.68(.16)***	0.399	0.074
		1.00	1.32	1.56	1.97		
Smoked While Preg.	M1	--	1.27(.15)***	1.28(.16)***	1.46(.16)***	N/A	0.031
		1.00	3.58	3.59	4.32		
	M2	--	1.09(.21)***	0.94(.26)***	0.91(.24)***	0.000	0.166
		1.00	2.97	2.57	2.49		
	M3	--	0.94(.21)***	0.75(.28)**	0.51(.25)*	0.000	0.178
		1.00	2.58	2.11	1.66		
Drank While Preg.	M1	--	-0.16(.16)	0.06(.13)	0.47(.14)**	N/A	0.005
		1.00	0.85	1.06	1.59		
	M2	--	0.01(.19)	0.11(.16)	0.38(.15)*	0.000	0.088
		1.00	1.01	1.12	1.46		
	M3	--	-0.05(.20)	0.01(.17)	0.05(.18)	0.000	0.102
		1.00	0.95	1.00	1.05		
Prenatal Health Behaviors Scale	M1	--	0.73(.09)***	0.89(.09)***	1.18(.09)***	N/A	0.019
		1.00	2.07	2.44	3.25		
	M2	--	0.46(.12)***	0.51(.15)**	0.70(.13)***	0.000	0.093
		1.00	1.58	1.67	2.02		
	M3	--	0.42(.13)**	0.43(.15)**	0.47(.14)**	0.000	0.100
		1.00	1.53	1.54	1.60		
N		1,072	1,586	1,140	544		

# p < .10; *p < .05; **p < .01; ***p < .001

Note: Standard errors are adjusted for clustering at the city-level. M1=Model 1, includes only relationship status categories; M2=Model 2, adds mother's background characteristics, parity, whether she has private health insurance, father's background characteristics, and whether the mother contemplated an abortion; M3=Model 3, adds relationship dynamics measures (relationship duration, whether father has children with other mothers, whether the father has a drug or alcohol problem, the relationship conflict scale, and whether the mother reports any physical abuse.

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