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FAMILIAL INSTABILITY AND YOUNG CHILDREN'S PHYSICAL HEALTH

August 2010

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DRAFT: DO NOT CITE WITHOUT AUTHORS' PERMISSION

Acknowledgement: The authors thank the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) through grants R01HD36916, R01HD39135, and R01HD40421, as well as a consortium of private foundations for their support of the Fragile Families and Child Wellbeing Study. The authors would also like to thank the Fragile Families Working Group for their valuable advice on this study. Portions of this study were funded through the Robert Wood Johnson Scholars in Health Policy Research Program. Earlier versions of this paper were presented at annual meetings of the Population Association of America and the Association for Public Policy Analysis and Management.

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ABSTRACT:

This paper uses recent longitudinal data about a cohort of young children born to mostly unmarried parents to examine the association between increasingly-complex patterns of family instability and physical health in early childhood. The analyses assess whether, and how, the association between family instability and child health varies across a number of family types. We consider several measures of children's health at age five (overweight/obesity, asthma diagnosis and overall health) and examine to what extent the association between family instability and child health varies across outcomes and depends on the number and timing of any familial transitions. We also explore a number of potential mechanisms through which family instability may affect child health and address the possibility that early child health may lead to, as well as result from, familial relationship instability. The results suggest that familial instability is related to worse child health, particularly among children born to co-resident (married or cohabiting) biological parents and for children who experience high levels of residential instability.

A large body of literature documents associations between living in increasingly-common "non-traditional" households (those not involving two married, biological parents) and children's outcomes. Considerable recent research, for example, has studied relationships between family processes and children's cognitive, educational, and behavioral outcomes. Less of this recent research has focused on children's physical health outcomes, despite evidence from past research suggesting relationships between family living arrangements/instability, and children's health. Adverse health outcomes during childhood are likely to have both immediate and long-term implications for children. Poor health during childhood may interfere with important developmental stages, perhaps preventing children from attending school regularly and engaging in a variety of activities that they might otherwise be able to do. Poor health in childhood has also been linked with worse health and socioeconomic well-being in adulthood (Case, Fertig & Paxson 2005).

The current study uses recent longitudinal data about a cohort of young children born to mostly unmarried parents to examine the association between increasingly-complex patterns of family instability and physical health in early childhood. We examine several measures of children's health, and assess to what extent the association between family instability and child health varies across these outcomes and depends on the number and timing of any transitions. We also explore a number of potential mechanisms through which family instability may affect child health and, finally, address the possibility that early child health may lead to, as well as result from, familial relationship instability.

BACKGROUND

Previous research documents associations between familial living arrangements and a number of children's outcomes, including (among others) early childhood behaviors, academic

achievement, family formation behaviors, mental health, and risk-taking behaviors. For the most part, such studies indicate that children living with two married biological parents tend to fare better than those living in less traditional family structures (see, e.g., Amato 2001). Although children's physical health has been studied less frequently than some other outcomes, there is also research documenting that living with two married biological parents is generally associated with better physical health outcomes for children. For example, compared with children living with two biological parents, children living with single mothers have been found to have significantly worse overall reports of physical and dental health (Angel & Worobey 1988, Bramlett & Blumberg 2007, Montgomery, Kiely & Pappas 1996), higher rates of asthma and respiratory allergies (Bramlett & Blumberg 2007, Dawson 1991), more missed days of school (Bramlett & Blumberg 2007), more frequent headaches, and more accidents and injuries (Dawson 1991) as well as worse mental and behavioral health outcomes (Bramlett & Blumberg 2007, O'Connor et al. 2000). In addition to identifying associations between family *structure* and childhood health, previous research (largely based on divorce) finds that family *disruption* may also be related to children's health outcomes. For example, there is evidence that children who have experienced parental divorce have higher rates of accidents, injuries and poisoning than children living in undisrupted, two-biological parent families (Bloom & Dawson, 1991; Dawson, 1991; For an exception, see Hango & Houseknecht, 2005). Other research suggests that the process of parental separation is also associated with higher rates of childhood illness relative to children living in undisrupted two-parent families (Mauldon, 1990).

Up to this point, due largely to data constraints, most previous research about the relationships between family structure and instability and child health has focused solely on parental marital status as the key indicator of family structure and parental divorce as the key

measure of familial instability. Yet, forty percent of all U.S. births in 2007 were to unmarried mothers (Hamilton, Martin & Ventura 2009), and recent estimates indicate that approximately half of unmarried mothers were cohabiting with their children's biological fathers at the time of the child's birth (Kennedy and Bumpass, 2008; Sigle-Rushton & McLanahan 2002). Further, instability is known to be particularly high in families with unmarried births (Carlson, McLanahan & England 2004).

Given these demographic changes, recent research has focused on the relationship between more fine-tuned and current measures of family structure and instability and a number of children's outcomes (Cooper et al., 2008, 2009). Relatively little of this research to date has focused on child health in particular, but some evidence suggests that the dissolution of both cohabiting and marital relationships among biological parents is associated with greater problems with asthma at or before age three (Harknett, 2009; Liu & Heiland, 2009). Research has not yet considered the relationship between these more detailed categories of family living arrangements and instability and other measures of children's health (or asthma beyond age 3). The current paper examines the relationship between familial structure and instability and three measures of child health (asthma, obesity and overall health) for a sample of five year-old children born to mostly unmarried, disadvantaged parents. Childhood overweight/obesity and asthma are two of the most common—and increasing—health conditions, particularly among already-disadvantaged populations. They are also potentially amenable to policy changes and therefore of considerable interest to those concerned with improving child well-being. Overall child health one of the primary measures of child health in social science research, and has the virtues of representing the child's general health (rather than a particular condition) and not being dependent on health care access and utilization.

How instability in familial living arrangements may affect child health

Our analysis is guided by a theoretical model of how familial instability may affect child health that is largely based on family stress or process models (see, e.g., Hetherington et al. 1998, Hill 1958). In this framework, familial transitions may lead to stressful life experiences for mothers and their children, such as geographic mobility, loss of social and economic resources, conflict with the child's father over child support or other disputes, or maternal depression (Avellar & Smock 2005; Holden & Smock 1991; McLanahan & Sandefur 1994).

These (and other) stressful life experiences may, in turn, lead to changes in family processes and parenting behaviors. Mothers may feel overwhelmed by taking on additional child care, employment or other responsibilities and have less time and physical and emotional energy to devote to providing a warm, consistent, stimulating, and nurturing environment for their children. Such effects are not limited to cases of union disruption. Beck et al. (2010), for example, find that coresidential relationship transitions—including both entrances and exits—are associated with significantly higher rates of maternal parenting stress and harsh discipline.

Such changes in family processes and parenting are expected to affect children's physical health status. In their model of how marital dissolution affects child health, Troxel and Matthews (2004) argue that decreased parental monitoring and modeling of behavior, inappropriate discipline, and lower levels of communication and affection may all lead to emotional dysregulation and insecurity for children, which may then be translated into adverse health outcomes through risky health behaviors, heightened/dysregulated physiological stress response, and impaired neurotransmitter functioning. Children's health may also be affected more directly by the intermediate stages in the hypothesized process—through, for example, living in sub-par housing conditions in crowded or polluted neighborhoods, lack of access to health care, or lack

of access to high quality foods and safe spaces for play and physical activity. Below, we briefly describe the processes by which we would expect familial instability to affect each of the specific outcomes we consider in the paper, and then discuss the potential role of the timing and number of any familial transitions as well as expected differences in the relationship between instability and child health across family structures.

How familial instability may affect overweight/obesity, asthma, and overall health

Childhood overweight and obesity

Familial instability can potentially influence children's weight in a number of ways. Most obviously, children's weight is directly impacted by their dietary intake and energy expenditures. Familial instability may lead to situations in which children have less access to healthy, well-balanced meals and fewer opportunities to engage in physical exercise. This, in turn, is related to children's BMI (Kimbro et al. 2010). In the face of familial instability, mothers may, for example, have fewer financial resources to procure fresh foods and access to safe outdoor play space, less time to prepare healthy meals and accompany their children to play outdoors, and less time and mental/physical energy to supervise their children in outdoor play and exercise, leading to higher rates of watching television and other sedentary activities. Maternal weight has also consistently been found to be a strong predictor of children's weight, and could be affected by the stressful experiences associated with familial transitions or, alternatively, with the weight gain that sometimes accompanies entrances into new unions (Sobal et al. 2003).

In addition to these more obvious factors, there is also emerging evidence that warm, responsive and boundary-enforcing parenting styles and higher cognitive stimulation are associated with a lower risk of overweight/obesity for children (Garasky et al. 2009, Rhee 2008, Rhee et al. 2006, Strauss & Knight 1999). Finally, there is also some evidence that exposure to

stressful events and circumstances, such as inter-parental conflict, may trigger a physiological response in children that may contribute to higher rates of abdominal fat and obesity (Bjorntorp 2001; Booth et al. 2000, Dimitriou et al. 2003)

Childhood asthma

There are several mechanisms through which familial instability may affect childhood asthma. First, lost economic resources due to familial transitions may lead mothers and their children to move into sub-par housing situations. Childhood asthma is known to be triggered by conditions such as mold, dust, inadequate ventilation, and cockroaches that are more likely to occur in such situations (Subbarao et al. 2009, Suglia et al. 2010).

There is also good evidence to suggest that maternal stress may be related to childhood asthma in a variety of ways. Increased maternal stress may lead to a series of behaviors--such as lower rates of breastfeeding, higher rates of smoking, and less adequate cleaning to avoid allergen exposure--which have been prospectively associated with wheezing among infants (Wright et al. 2002). There is also emerging biological evidence that familial stress and instability may directly influence the development of asthma in children; for example, Wright et al. (2002) found a direct effect of caregivers' perceived stress on infants' subsequent wheezing. Similarly, another prospective study found that parenting difficulties in the very first weeks of life were associated with subsequent asthma onset and persistence through age 6 (Klinnert, Mrazek, & Mrazek, 1994; Klinnert et al., 2001; Mrazek et al., 1999). Researchers have suggested that maternal parenting quality and stress may lead to changes in immune development that are associated with increased risk of asthmatic symptoms (Klinnert et al., 2001), and that the way in which children physiologically respond to stress, which is affected by the stressful life events

and family functioning, may be related to asthma and other atopic illnesses (Kaugurs et al. 2004).

Finally, familial instability may be associated with diagnosed childhood asthma through affecting which children have access to—and receive—regular health care. Children who lose or gain health insurance through changes in family structure may have a lower or higher, respectively, chance of being diagnosed with asthma simply because of their change in access to or utilization of health care.

Mother-rated overall child health

Maternal-rated overall child health (measured through a question such as "Overall, how would you rate your child's health? Excellent, very good, good, fair or poor?") is one of the most commonly-used measures of children's health in social science research. Maternal ratings of child health have been found to predict levels of pediatric health care utilization (Cafferata & Kasper 1985), and are often used as indicators of child health status in clinical care settings as well as in research. Although similar validation studies have not yet been conducted among children, among adults, such global self-rated measures are widely-recognized as powerful predictors of future health outcomes, even after controlling for a host of "objective" health measures (Idler & Benyamini 1997).

Mothers' ratings of children's overall health are likely to be affected by familial instability in at least two ways. First, previous research about the predictors of maternal ratings of overall child health suggests that the child's physical health conditions are important factors in mothers' ratings (Arcia 1998, Monette et al. 2007). Thus, to the extent that the instability has an effect on the child's physical health status—through, for example, obesity, asthma, or other conditions not measured here--, this is likely to be reflected in the mother's overall ratings.

Second, there is also evidence that mothers' own mental and physical health significantly predict maternal-rated child health (Angel & Worobey 1988, McCormick et al. 1993, Waters et al. 2000), suggesting that changes in mothers own' health as a result of familial instability may also have an impact on mothers' ratings of their children's health.

The role of the timing and number of transitions

Although changing living arrangements are likely at least temporarily stressful in nearly every situation, the effects may wane over time as families and children adjust to their new situations and regain some of the resources (be they economic or social) they may have lost during a transition period. Research about children's post-divorce adjustment, for example, suggests that barring any additional disruptions, most children and families are relatively well-adjusted to the divorce within two years (Hetherington 1989). Similarly, a recent study of children born to mostly unwed parents finds that recent changes in family structure have a greater impact on maternal parenting stress and harsh parenting than familial instability occurring in the past (Beck et al., 2010). Thus, we would expect that more recent transitions would have a larger impact on child health than more distant transitions (although in the case of asthma, once a child is diagnosed, he/she cannot be "undiagnosed").

Related to the timing of the transitions, the total number of transitions is also likely to have an impact on a child's well-being. Cumulative risk is believed to increase with the number of transitions, such that it becomes more difficult to adjust in the face of continual or chronic instability (Hetherington 1989). Children faced with chronic instability in their family structures are likely at a particularly high risk for negative outcomes, since chronic instability may be associated with less consistent parenting, less consistent routines and schedules, and perhaps even more instability in the economic and social resources outlined above. This hypothesis is

supported by previous research suggesting that increasing numbers of maternal residential relationship transitions are associated with more externalizing, attention and social problems for young children (Cooper et al. 2010). Therefore, we would expect that increasing numbers of familial transitions would be associated with worse health outcomes for children.

Differences across family structures

The relationship between familial instability and children's health outcomes is likely to vary across family structures. The dissolution of a parental marriage, for example, is expected to be more detrimental than the dissolution of a parental cohabitation, given that marriage is a more institutionalized, permanent relationship with greater investments in shared economic and social resources than cohabitation (Graefe & Lichter 1999, Heimdal & Houseknecht 2003; Kenney 2004). As a result, divorce is more likely to be associated with losses in income and other economic resources, losses in social networks, and perhaps a greater emotional impact given the expectation of a longer time horizon. Harknett's findings (2009) suggest that the dissolution of a parental marriage is more detrimental than the dissolution of a parental cohabitation for children's asthma at one year of age.

The effect of the number of transitions on child health may also vary according to where children "start" in terms of family structure. For example, one transition is expected to be worse for children born to married or cohabiting parents than to children born to mothers not living with partners, because one move necessarily involves an entrance for a mother living without a partner, versus dissolution for a married or cohabiting couple. Although union entrances and exits are both expected to cause some stress and disruption in family routines and behaviors, we would expect union entrances to be relatively better for children's health because the addition of a partner to the household (either the child's father or another man) provides potentially greater

access to parental, economic, and social resources that may counterweigh the negative effects of adding new household member. There are, however, likely to be exceptions. In cases where biological parents' cohabiting or marital relationships are characterized by a high degree of conflict, for example, union dissolution may be associated with *improvements* in both maternal and child well-being. Empirical evidence suggests that some of the association between parental divorce and worse child health outcomes may be due to parental conflict experienced prior to the divorce (Hanson, 1999; Troxel & Matthews, 2004). It is therefore important to consider potential mediating factors such as the quality of the relationship between the child's mother and biological father, who is likely to play a continued role (either positively or negatively) even after a parental union dissolution. Similarly, the effect of instability on child health in any of the family structures may be exacerbated or buffered by a mothers' sense of well-being and social support.

In summary, there are many mechanisms through which we would expect to find that familial instability may be associated with children's overweight/obesity, asthma and overall health. In the following analysis, we address the extent to which these hypotheses are borne out in a recent birth cohort of children born to mostly unwed parents in urban areas.

DATA AND METHODS

Data come from the Fragile Families and Child Wellbeing Study, a longitudinal study of nearly 5,000 children (3,700 born to unmarried parents) born between 1998 and 2000. Parents were interviewed at the time of the child's birth and approximately one, three and five years later. In addition to the "core" telephone interviews at each wave, "In-Home" supplemental interviews were conducted in-person with a subset of mothers and their children three and five years after the birth (Reichman et al., 2001.) Because most young children live with their

mothers throughout early childhood, we limit the analysis to children living with their mothers at least half of the time. We use information from mothers' reports in the baseline survey and the three- and five-year core and in-home follow-up surveys.

Respondents missing on a particular dependent variable are dropped from the analysis of that outcome, but may be included in the analytic sample for other outcomes. Approximately two percent of those that participated in the five year core survey were missing information on the maternal report of either asthma or child health. Of those who took part in the in-home observational component, 9.1% were missing the height or weight information needed to compute the measure of overweight/obesity. Mothers not taking part in the in-home supplement are not included in the analysis of childhood overweight/obesity, resulting in a smaller analytic sample size for this outcome.

Regression-based multiple imputation methods (using the "proc mi" command in SAS) with five imputations are used to impute values for all missing independent variables. Because mothers not included in the In-Home supplemental interview are missing information (by design) about all independent variables drawn from that supplement, we impute this information for those mothers. We also impute information about independent variables for the 16% of the mothers who were interviewed in the In-Home supplement but were missing information about one or more of the independent variables.

Measures

Child health

We examine three measures of physical health: whether the child is overweight or obese, whether the child has ever been diagnosed by a health professional as having asthma, and the mother's overall assessment of the child's health (possible ratings are *poor, fair, good, very*

good, and *excellent*). The primary analyses are based on measures of these outcomes when the focal child was approximately five years old. Supplemental analyses use comparable measures when the children were three years old to address the possibility of reverse causality. With the exception of the child being overweight/obese, all of the outcomes are mother-reported. The child's height and weight were measured by the interviewer during the in-home survey. Overweight/obese is defined, in accordance with the National Center for Health Statistics guidelines, as the child's BMI being at or above the 95th percentile for the child's age and sex. Because very few mothers reported that their young children were in poor health, the response categories "fair" and "poor" are combined, resulting in a four-category measure of overall child health status.

Predictor variables

Family structure and instability

Our measure of family structure categorizes children according to their living arrangements at birth using a combination of the mother's marital status and whether she was living with the child's biological father at that time. This results in 3 categories: married to the child's biological father, unmarried but cohabiting with the child's biological father, and unmarried and living apart from the child's biological father. Each of these categories is then sub-divided into categories based on the measure of instability being used in a particular model (e.g., married parents at birth, 3+ transitions). Our models separately examine three specifications of family instability: a dichotomous measure of any instability in maternal residential partnerships between the baseline and five-year interview; a measure of the number of maternal transitions (0, 1, 2 and 3 or more) over the five-year period; and a measure of the timing of any maternal transitions (no transitions, only early, only late, and both early and late).

Early transitions are defined as those occurring between the baseline and three-year interview, and late transitions are defined as those occurring between the three- and five-year interviews. We do not consider biological parents moving from a cohabiting to a marital relationship as a transition because this change does not involve a change in the child's residential living arrangements.

In the regression results presented in Tables 2 and 3, the omitted category is children born to mothers who were not living with the child's biological father ("single") and who remained without a coresident partner in the subsequent survey waves (and are thus described as "stable" because they did not experience any transitions in living arrangements). We also discuss results in the text from comparisons made by changing the reference category in the models. Our categorization by birth structure makes the patterns we observe easier to interpret and more substantively meaningful than considering instability for all groups combined. We know, for example, that one transition for a single-at-birth mother must mean that the mother moved in with a partner (either the child's biological father or another partner) and then stayed with that partner for the remainder of the five-year period. Alternatively, one transition for a cohabiting-at-birth mother must mean that the couple broke up and then the mother remained without a resident partner for the rest of the observation period. Similarly, two or more transitions for a family where the mother started out without a residential partner must involve at least one relationship formation and dissolution, and three or more transitions must involve more than one union formation (and at least one dissolution).

Control variables

All of our regression models control for a series of sociodemographic variables that are likely to be associated with both family structure/instability and child health outcomes. These

variables are all mother-reported at the time of the child's birth, and include mother's age, educational attainment (defined as less than high school/GED, high school diploma, and some college or more), race/ethnicity (defined as white and other non-Hispanic, black non-Hispanic and Hispanic), and nativity status, the child's sex, whether the child had a low birth weight (under 2,500 grams), and whether the child was the mother's first birth.

We also include several control variables that are intended to help account for the possibility that any associations observed between family living arrangements and child health might be due to selection bias. These controls include a measure of the number of relationships the mother had prior to her relationship with the biological father (to control for prior relationship instability), a measure of the mother's impulsivity (an abbreviated version of Dickman's [1990] impulsivity scale), measures of the mother's prenatal smoking, drinking, and health care receipt, and a measure indicating whether the mother reported that either of her parents had a history of psychological problems.

Potential mechanisms

We consider four substantive groups of potential mechanisms through which family instability may affect child health outcomes. The substantive groups include: the child's health care access and utilization; maternal parenting (including health-related behaviors); maternal well-being and social support; and familial economic resources. The child's health care access and utilization includes: whether the child has a regular source of medical care and whether the child had at least one well-child visit in the past year. Maternal parenting behaviors include: the number of fast food meals the child eats in a week, the number of hours the child watches TV and the number of hours the child plays outside on a typical weekend day, parenting routines (such as having a regular bedtime), and the frequency of harsh parenting. Maternal well-being

and social support includes: maternal parenting stress (i.e., stress specific to parenting responsibilities), maternal depression, perceived social support, and relationship quality with the child's biological father. Finally, familial economic resources include: the family's poverty level, the child's health insurance coverage (private, public or uninsured) and the number of residential moves the child has experienced.

Rather than considering these measures at one point in time, we construct variables based on the change experienced in each of these domains over the survey waves, comparing children with consistently high, low, and average increasing, decreasing, and unstable scores in each of these domains. For most of our mediators, before combining the specific items into our four indices, we first divided mothers by whether they were in the bottom, middle or top third of the distribution on each of these variables. As our indicator of poverty status had a series of cut points, it allowed us to assign poor, low-income and non-poor mothers into the bottom, middle, and top third. For dichotomous indicators such as regular source of child care, health insurance, and well child visit in last year, we assigned those that responded "no" as belonging to the bottom category, and those that responded "yes" to the top. These distribution indicators for each of our measures were then summed within our substantive categories (parenting, maternal wellbeing, economic resources, and health care utilization) by survey wave. These measures were then again divided by thirds and then categorized into six groups: consistently in the highest third, consistently in the middle third, consistently in the lowest third, decreased over time, increased over time, or unstable (first a decrease followed by an increase, or vice-versa). For all of the indices, higher values represent better characteristics (e.g., greater economic resources and maternal well-being). Additional information about the mediators as well as the results from each indicator separately is available upon request.

Analytic strategy

After a brief description of the analytic sample, we begin by presenting bivariate associations between family relationship trajectories across the survey waves and child health at age five. We then use nested logistic and ordered logistic regressions to examine the multivariate associations between family instability and children's health. All of the models include the full set of control variables. Model 1 for each outcome compares children in stable versus unstable family types, Model 2 separates any instability into one, two, or three or more residential union transitions, and Model 3 separates any instability into those occurring only early, only later, and in both periods. Next, we investigate whether the association between familial instability and child health can be explained by including the potential mechanisms in the models, using likelihood ratio tests to assess whether the addition of the mechanisms to the model improves the overall model fit. Finally, we present results from models that test for reverse causality, or the possibility that child health *leads to*, as well as results from, familial instability. Although the analyses are unweighted, we control for a number of characteristics (such as maternal marital status at birth, age, race and education level) that are used in constructing the weights for this sample.

RESULTS

Appendix Table 1 provides a basic description of the primary sample used for analysis, and outcomes at 5 years. As indicated in the table, this is a disproportionately minority and disadvantaged sample. Nearly half of the mothers in the sample are non-Hispanic black, and more than one-quarter are Hispanic. Approximately three-quarters of the children were born to unwed parents, and nearly two-thirds of the children's mothers never attended college.

Table 1 presents bivariate associations between maternal relationship trajectories and child health. Consistent with prior research, the results suggest that before controlling for any other factors, children living with stably-married biological parents generally have lower rates of asthma and better overall health than children living in less traditional family situations. Although they also have relatively low rates of overweight/obesity, children with stably-married parents are equally as likely as children born to married parents who later separated and children with stably-cohabiting biological parents to be overweight/obese at age five.

Among children not living with stably-married biological parents, we observe some variation in patterns across outcomes. In general, however, children born to cohabiting parents who experience instability in their living arrangements (labeled "unstable cohabiting" in the table) and those born to mothers living without partners tend to fare worse than children born to married parents who later separate/divorce and those living with stably-cohabiting biological parents. For example, rates of fair/poor overall health are highest among children with unstably-cohabiting biological parents (but also relatively high for children born to single mothers).

We next present results from multiple regression models with the full set of controls. Table 2 presents odds ratios from logistic and ordered logistic regressions predicting children's physical health around the time of the child's fifth birthday based on their family structure at birth and subsequent instability. We run three models for each of the three outcomes. The odds ratios presented in the table represent comparisons with the omitted category, which is children who were born to mothers living without partners who did not experience any instability in the subsequent waves. Odds ratios greater than one indicate worse health, and odds ratios less than one indicate better health. Where noted, we also changed the reference categories (results discussed but not shown) to make comparisons among other groups. In Model 1, we compare

children in stable living arrangements and those who experienced any instability post-birth. In Model 2, we subdivide children who experienced any instability into those experiencing one, two, and three or more transitions. Finally, in Model 3 we subdivide children who experienced instability into those experiencing instability only early during the observation period, only late, or during both time periods.

Although our primary focus is on instability in familial relationships, the models in Table 2 also allow us to make comparisons by family structure among children in stable living arrangements. Children living with stably- married biological parents stand out as having the best health outcomes among these groups. Relative to stably-single mother families, children living with stably-married biological parents have at least forty percent lower odds of each of the negative health outcomes (OR in Model 1, for example, are 0.51, 0.56 and 0.57, $p<.05$ for the three outcomes of interest). Among those born to unwed parents, those whose parents stably cohabited throughout their first five years also have odds of being overweight/obese and diagnosed with asthma that are at least one-quarter lower than mothers with stably-single mothers (OR in Model 1, for example, are 0.68 and 0.75, respectively, $p<.1$). Changing the reference category (results not shown) also suggests that children living with stably-cohabiting biological parents have marginally higher rates of asthma diagnosis and significantly worse overall health than children living with stably-married biological parents.

We next examine the association between any familial instability and children's health outcomes (Model 1). Counter to our expectation that instability would be associated with worse child health for all family structures, residential relationship instability in families where the mother was not living with a partner at the child's birth is not significantly associated children's health at age five (ORs = 0.86, 1.05, 0.95 for the three outcomes). Instability is, however, related

to child health outcomes in families where the biological parents lived together when the child was born. As the italicized odds ratios in Table 2 indicate (representing significant associations identified by changing the reference categories), relative to their stably-married and stably-cohabiting counterparts, children whose parents were living together at birth and then experienced instability (and thus, by definition, the end of the parents' coresidence) tend to experience worse health outcomes. For example, the odds of the child being overweight/obese for children whose parents were cohabiting at birth and then broke up (OR = 1.03) are significantly higher than those for continuously-cohabiting parents (OR = .68), and not different in either substance or statistical significance from children with stably-single mothers (the reference group). Although the patterns are similar in direction for the other two outcomes considered, the differences between stably-cohabiting and unstably- cohabiting parents are not statistically significant for childhood asthma and overall health.

Among children born to married parents, there are no differences in overweight/obesity based on whether the parents were stably or unstably living together (i.e., between stably married and divorced). In contrast, children born to married parents whose parents later divorced/separated have odds of asthma diagnosis that are quite a bit higher (in magnitude but not statistical significance) than children whose parents remained stably married (ORs = 0.71 vs. 0.56). And children whose parents were married at the child's birth but later separated/divorced have significantly worse overall health than children with stably-married biological parents (ORs = 0.85 vs. 0.57).

Models 2 and 3 for each of the three outcomes further delineate instability by the number of transitions (Model 2) and the timing of the transitions (Model 3). We expected to find that greater numbers of transitions would be associated with worse outcomes, as would transitions

occurring either late in or throughout the observation period (rather than only early-on). In terms of the total number of transitions (Model 2), the results provide some support for the hypothesis that chronic instability is associated with worse child health. For example, children born to married parents who subsequently experience three or more transitions have much higher odds of asthma diagnosis than children who experienced one or two transitions (ORs = 2.01 versus 0.64 and 0.65, respectively). The italicized numbers in this case indicate that these comparisons are statistically significant. Although limited statistical power (due to relatively small sample sizes in some cases) constrains our ability to identify other statistically significant relationships, the magnitude and direction of several other results are also consistent with the hypothesis that high levels of instability are associated with worse health outcomes for children. For example, children born to married parents who later experience three or more transitions also have far higher odds of worse overall health (OR = 1.60) than children with fewer transitions. Similarly, among children born to cohabiting parents, the odds ratios for all three outcomes are higher in magnitude for children who experienced three or more transitions than for children with fewer transitions (ORs for the three outcomes among children with three or more transitions = 1.45, 1.17 and 1.22).

We hypothesized that one transition would be worse for children born to married or cohabiting parents than for children born to single mothers, since in the former case it would necessarily involve a parental union dissolution and in the latter case it would represent a union entrance. The results provide little evidence of any differences in the association between one transition and child health based on the child's living arrangements at birth. Also contrary to our hypothesis that divorce would be more detrimental for child health than the dissolution of a

parental cohabiting union, we find little support for the idea that children who experience parental divorce fare worse than those born to cohabiting biological parents who later separate.

Our final measure of instability tests the association between the timing of any transitions experienced and children's outcomes (Model 3). We find only limited support for the hypothesis that the timing of transitions matters for child health. Contrary to our expectation that late transitions would matter most, we find that children experiencing only late transitions (among those born to cohabiting parents) have *lower* odds of asthma diagnosis than the reference category (children born to mothers without partners who do not repartner), (OR = 0.62, $p<.05$). Comparisons within categories (see italicized numbers in table) identify only two significant differences by the timing of the transitions, both of which are among children born to cohabiting parents. Among these children, those with only late transitions have the lowest odds of asthma diagnosis and overall poor health (OR = 0.62 and 0.80, respectively). Children experiencing both early and late transitions appear to have higher odds than others of asthma diagnosis in this case (OR = 1.11), and children experiencing only early transitions have higher odds of worse overall health (OR = 1.17).

In summary, we find sizeable differences in health outcomes among children living in stably-married, stably-cohabiting, and stably-single mother families, and evidence that instability in family living arrangements among children living with both biological parents at birth (but not among children born to single mothers) is associated with worse health outcomes at age five. We also find some support for the hypothesis that chronic instability is associated with worse outcomes. Contrary to our hypothesis regarding the timing of transitions, we find very few differences in the association between instability and child health based on the timing of the transitions experienced, and those that we do find sometimes run counter to our expectations.

Taking the dichotomous measure of instability as an example, Table 3 compares the odds ratios associated with familial instability before and after the inclusion of several substantive groups of potential mediator variables to assess the extent to which these factors can "explain" the associations observed in Table 2.

Likelihood ratio tests indicate that adding the groups of potential mediator variables to the models significantly improves the model fit for two out of the three measures of child health (asthma and worse overall child health). Despite these significant associations, however, adding the mediators to the models did not generally change the odds ratios associated with the family structure trajectories, suggesting that the associations identified between family relationship trajectories and child health cannot be explained through these processes. There are, however, a couple of exceptions. The relationship between stable marriage and overall health is attenuated (but remains large and significant), and the association between stable cohabitation and asthma becomes non-significant after the addition of the potential mediators.

In a number of cases, there are significant direct associations between the mediators and the outcomes. Children in families with consistently high economic resources and levels of maternal support and well-being have significantly better health than children in all of the other categories. Children with consistently low levels of maternal parenting (largely health-related behaviors) and those with unstable maternal behaviors have worse overall health than children with consistently high levels of maternal parenting. Perhaps surprisingly, children with consistently-average levels of maternal support and well-being and increasing levels of health care access and utilization have lower rates of asthma diagnosis than children with consistently-high levels in these two categories. In the latter case, this may simply reflect higher diagnosis rates (rather than differences in the underlying condition) among children with consistently-high

access to health care. Instability in familial economic resources is associated with marginally higher rates of asthma diagnosis. Additional statistical tests between categories suggest that children experiencing a decline in maternal wellbeing and support are more likely to be diagnosed with asthma than those experiencing chronically low conditions. In contrast, for overall health, children experiencing chronically low maternal wellbeing and support fare worse than those with a decline or an unstable history.

Our final analysis (presented in Table 4) examines the possibility that family relationship transitions may result from, as well as lead to, children's health problems. This possibility is borne out by research by Reichman and colleagues suggesting that poor health (low birth weight, physical disabilities, and delayed mobility) among one-year olds was significantly associated with a lower probability of the biological parents coresiding, and a higher probability of the parents transitioning into a less-involved relationship (Reichman, Corman & Noonan, 2004). Our analyses in Table 4 examine whether more common and less severe child health problems at age three significantly predicted residential relationship transitions between ages three and five. We first test this question using the full sample of children (Model 1), and then use a series of interactions between child health and family structure at birth to assess whether reverse causality is more operative for particular family types (Model 2). We find evidence of reverse causality only in the case of the child being overweight/obese. Children who were obese/overweight at age three had odds of experiencing maternal residential relationship transitions in the following two years that were seven percent higher than those of their non-overweight counterparts. The non-significant interaction terms indicate that this finding does not differ across baseline family structures, although the main effect term for overweight/obesity is attenuated and statistically non-significant in the interaction model.

DISCUSSION

Little research to date has considered the association between increasingly-complex and unstable family structures and child health. This study examined the association between familial instability and health for a recent birth cohort of children largely born into non-traditional family structures. Stability in family relationships was expected to be associated with better health outcomes for children, regardless of the family type. Our results, however, suggest that although relationship instability is important for children born to married and cohabiting parents, there are no differences in health outcomes for children with stably-single mothers and those who were born to single mothers who later moved in with husbands or cohabiting partners. We also found little evidence either that parental divorce is worse for child health than the dissolution of a parental cohabiting union, or that one transition is worse in cases where it represents a union dissolution (i.e., children living with co-resident parents) than where it represents a union entrance (i.e., children born to single mothers).

Also contrary to our expectations, we did not observe big differences in children's health outcomes based on the timing of familial transitions. The only statistically significant difference found was that for children born to cohabiting parents, parental union dissolution occurring by the child's third birthday was related to higher rates of asthma and worse overall health at age five than transitions experienced between the child's third and fifth birthdays. It is possible that the more recent transitions have not had sufficient time to "take effect," and that future waves of data will show an equally strong association between later transitions and children's health. Alternatively, it is possible that parental separation is particularly harmful for child health if it occurs very early in the child's life. Future research using additional waves of data will be better able to answer this question.

Family stress theory suggests that higher levels of instability will contribute to a greater cumulative risk for negative outcomes. Although the statistical significance of our findings is limited in some cases by sample size constraints, our results support the hypothesis that chronic instability is associated with worse health. Among children born to married parents, for example, the odds of asthma diagnosis are more than twice as high for those who experience three or more transitions relative to those with less instability.

For information about disparities in children's health in various living arrangements to inform health policy, the mechanisms through which family structure/instability affects children's health must be better understood. The potential mediating mechanisms we considered, however, explained little of the variation in the associations that we observed, even in cases when there was a strong direct relationship between the "mediator" and the child outcome of interest. It is possible that our measurement of the timing of the mediators does not line up well with the specific relationship transitions. Although we were able to identify changes in the mediating mechanisms over the survey period, data limitations prevented us from pinpointing exactly when changes in the mediators occurred relative to changes in family structure.

Child health may be a cause as well as a result of family instability. Our models that tested this possibility find that only one of the measures of child health at three years—the child being overweight/obese—significantly predicted residential relationship transitions in the next two years. This finding is consistent with the reverse causality hypothesis, but could also result from a period of household conflict, stress and break in routines that often precedes a union dissolution (and thus could have already "affected" the child's weight prior to the union dissolution). More precise data on the timing of various stages of the dissolution process would be necessary to adjudicate between these explanations.

The analyses presented here have a few limitations. The fact that most young children are healthy means that there is relatively little variation in our outcomes of interest, making it difficult to statistically identify small but real differences that might exist. This problem is exacerbated in some cases by relatively small numbers of children in particular family types (unstable married biological parents, for example). An additional limitation is that with the exception of childhood overweight/obese status, all of the measures are mother-reported. To the extent that mothers in different family structures differentially report child health status (which could happen for a variety of reasons), this may influence our results. Finally, our measures of family structure/instability are based on mothers' reports at each of the survey waves. It is therefore possible that our measures of instability underestimate the true instability in children's family living arrangements, particularly among "single" mothers not living with partners.

In interpreting the current findings, it is important to keep the urban context in mind when considering the role of familial instability in children's health outcomes, as these relationships might operate differently in other contexts. In less resource-rich settings, for example, children living in more disadvantaged families might be *less* likely to become obese and/or to be diagnosed with asthma due to inadequate access to nutrition and health care. Future research could evaluate whether these relationships are applicable across socio-cultural and geographic settings. Future research will also benefit from new waves of data collection in the Fragile Families study, which will provide more variation in children's health outcomes and allow researchers to test whether the associations we observe between family relationship patterns and children's health over their first five years continue after the children enter school.

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Table 1. Bivariate associations between child health outcomes and family structure and relationship history at 5 years, N = 4048

Mother's Relationship History	Child Health Outcomes					
			Mother's rating of child's health (%)			
	Overweight/ Obese (%)	Ever diagnosed with asthma (%)	Excellent	Very Good	Good	Fair/ Poor
Relationship History at Year 5, by Birth Status						
1. Stable married to BF (n = 803)	12.9 [4,5,6]	13.7 [2,3,4,5,6]	70.3 [2,3,4,5,6]	21.8 [3,4,5,6]	7.0 [2,3,4,5,6]	0.9 [4,5,6]
2. Unstable Married (n = 204)	12.4 [4,5]	18.7 [1,4,5,6]	62.3 [1]	25.5	10.9 [1]	1.3 [4]
3. Stable cohabiting with BF (n = 609)	16.1 [4]	20.6 [1,4,5,6]	59.4 [1]	27.1 [1]	12.0 [1,5,6]	1.6 [4,6]
4. Unstable Cohabiting (n = 842)	20.5 [1,2,3]	26.4 [1,2,3,6]	58.9 [1]	27.6 [1]	10.6 [1]	2.9 [1,2,3]
5. Stable living apart (n = 500)	20.2 [1,2]	27.3 [1,2,3]	59.0 [1]	29.2 [1]	9.2 [1,3]	2.6 [1]
6. Living apart at birth, unstable (n = 1090)	17.3 [1]	29.2 [1,2,3,4]	60.1 [1]	28.3 [1]	9.0 [1,3]	2.7 [1,3]

Note: The sample is limited to children who lived at least half-time with their biological mothers at the time of the five-year interview. Sample sizes for overweight/obese are smaller than those listed because this measure was only included in the In-Home Supplemental Survey (see text for more details). For overweight/obese, the sample sizes are (from stable married to living apart at birth, unstable): 350,105,321,462,283,621. Superscripts indicate that differences between categories are at least marginally different ($p<.1$). Statistical significance is determined using One-Way ANOVAs with Scheffe adjustments for multiple comparisons.

Table 2. Odds ratios from logistic and ordered logistic regressions predicting child health outcomes at age 5

	OVERWEIGHT/OBESE			ASTHMA			HEALTH STATUS (4=FAIR/POOR), ologit		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Family relationship trajectories									
Living apart at-birth									
Stable (omitted)[1]									
Unstable (1 or more transitions)	0.86	-	-	1.05	-	-	0.95	-	-
One transition	-	0.85	-	-	1.05	-	-	1.22	-
Two transitions	-	0.96	-	-	0.96	-	-	0.87	-
Three or more transitions	-	0.77	-	-	1.23	-	-	0.83	-
Only early transition(s)	-	-	0.90	-	-	1.01	-	-	0.96
Only late transition(s)	-	-	0.76	-	-	1.15	-	-	1.07
Both early and late transitions	-	-	0.92	-	-	1.03	-	-	0.83
Cohabiting at-birth									
Stable (no transitions)	*0.68* ^	*0.68* ^	0.69 ^	0.75 ^	0.75 ^	0.75 ^	0.91	0.90	0.90
Unstable (1 or more transitions)	*1.03*	-	-	0.93	-	-	1.12	-	-
One transition	-	*1.03*	-	-	0.87	-	-	1.03	-
Two transitions	-	0.90	-	-	0.92	-	-	0.92	-
Three or more transitions	-	1.45	-	-	1.17	-	-	1.22	-
Only early transition(s)	-	-	1.07	-	-	*0.93*	-	-	*1.17*
Only late transition(s)	-	-	1.06	-	-	*0.62* *	-	-	*0.80*
Both early and late transitions	-	-	0.98	-	-	*1.11*	-	-	*0.95*
Married at-birth									
Stable (no transitions)	0.51 **	0.51 **	0.51 **	0.56 **	0.55 **	0.55 **	*0.57* **	*0.57* **	0.57 **
Unstable (1 or more transitions)	0.52 ^	-	-	0.71	-	-	*0.85*	-	-
One transition	-	0.49	-	-	*0.64*	-	-	*0.90*	-
Two transitions	-	0.51	-	-	*0.63*	-	-	0.64	-
Three or more transitions	-	0.76	-	-	*2.01*	-	-	1.60	-
Only early transition(s)	-	-	0.49	-	-	0.64	-	-	0.92
Only late transition(s)	-	-	0.59	-	-	0.73	-	-	0.83
Both early and late transitions	-	-	0.44	-	-	0.82	-	-	0.73
Control Variables									
Mother's race/ethnicity									
Non-Hispanic black	1.23	1.23	1.23	1.67 **	1.68 **	1.66 **	1.25 *	1.24 *	1.24 *
Hispanic	1.92 **	1.93 **	1.92 **	1.76 **	1.78 **	1.79 **	1.38 **	1.38 **	1.39 **
Mother's baseline education (some college or more omitted)									
Less than high school/GED	1.01	1.01	1.01	0.89	0.89	0.89	1.01	1.02	1.01
High school diploma	1.00	1.00	1.00	1.02	1.02	1.03	0.94	0.95	0.95
Mother is US-born	0.93	0.93	0.93	1.53 **	1.52 **	1.53 **	0.51 **	0.51 **	0.51 **
Child is male	0.85	0.85	0.85	1.50 **	1.50 **	1.50 **	1.24 **	1.24 **	1.24 **
Child born at low/very low birth weight	0.74	0.75	0.75	1.72 **	1.71 **	1.72 **	1.50 **	1.51 **	1.50 **
Child is mother's first	1.24 ^	1.24 ^	1.25 ^	0.75 **	0.75 **	0.75 **	0.86 *	0.86 *	0.86 *
Mother's baseline age	1.03 *	1.03 *	1.03 *	0.99 ^	0.99 ^	0.99 ^	1.01 *	1.01 *	1.01 *
# of relationships before biological father	1.02	1.02	1.02	1.00	1.00	1.00	0.99	0.99	0.99
Family history of psychological problems (mother)	1.12	1.13	1.12	1.17 ^	1.17 ^	1.17 ^	1.30 **	1.30 **	1.30 **
Mother's impulsivity	1.00	1.00	1.00	1.04	1.04	1.04	0.71 **	0.71 **	0.71 **
Mother received prenatal medical care	0.84	0.84	0.84	1.19	1.18	1.17	1.29	1.28	1.30
Mother smoked during pregnancy	0.88	0.88	0.88	0.96	0.94	0.95	0.92	0.92	0.93
Mother drank during pregnancy	0.79	0.79	0.79	0.71	0.72	0.71	1.20	1.20	1.21
N	2142	2142	2142	4048	4048	4048	4048	4048	4048

** p<0.01; * p<0.05; ^ p<0.10 two tailed

[1] The omitted category for all three models for each outcome is children who were born to mothers living apart from the children's fathers who experienced no subsequent transitions

Note: The sample is limited to children who lived at least half-time with their biological mothers at the time of the five-year interview. Numbers in italics are significantly different (p<.1) from one another.

Table 3. Role of potential mediators in explaining associations between maternal residential relationship instability and child health at age 5, OR from logit and ordered logit models

	Overweight/Obese		Asthma		Worse Overall Health Status	
	M1	**M2**	**M1**	**M2**	**M1**	**M2**
Maternal residential relationship transitions (stably-single omitted)						
Living apart at birth, unstable (1 or more transitions)	0.86	0.87	1.05	1.05	0.95	0.97
Cohabiting at birth, stable	0.68 ^	0.68 ^	0.75 ^	0.79	0.91	1.08
Cohabiting at birth, unstable (1 or more transitions)	1.03	1.02	0.93	0.94	1.12	1.05
Married at birth, stable	0.51 **	0.51 *	0.56 **	0.58 **	0.57 **	0.75 *
Married at birth, unstable (1 or more transitions)	0.52 ^	0.49 ^	0.71	0.74	0.85	0.90
Potential mediators						
Maternal Parenting (consistently high omitted)						
Consistently average		0.94		1.06		1.31
Consistently low		1.17		0.79		1.71 **
Decreasing		1.13		0.88		1.27
Increasing		1.14		0.78		1.21
Unstable		1.27		0.88		1.40 *
Health Care Access and Utilization (consistently high omitted)						
Consistently average		0.91		0.76		0.91
Decreasing		1.01		0.97		0.92
Increasing		0.83		0.75 *		1.00
Familial Economic Resources (consistently high omitted)						
Consistently average		1.03		0.89		1.45 *
Consistently low		0.83		1.29		1.46 *
Decreasing		0.97		1.14		1.40 **
Increasing		0.90		1.11		1.28 *
Unstable		1.14		1.33 ^		1.47 **
Maternal Support and Wellbeing (consistently high omitted)						
Consistently average		1.27		0.72 ^		1.40 *
Consistently low		0.99		1.18		2.55 **
Decreasing		1.20		0.86		1.56 **
Increasing		1.17		0.89		1.39 **
Unstable		1.02		1.08		1.48 **
Likelihood Ratio Test (df)	8.0 (18)		32.09 (18)		73.56 (18)	
Prob > $\chi 2$	0.98		0.02		0.00	
N	2142	2142	4048	4048	4048	4048

** p<0.01; * p<0.05; ^ p<0.10 two tailed

Note: The sample is limited to children who lived at least half-time with their biological mothers at the time of the five-year interview.

All models control for mother's age, race/ethnicity, nativity, education, family history of mental health problems, number of relationships before the biological father; child's gender, birth order and low birth weight. Please see text for a description of the individual items included in each of the four mediator indices as well as a full description of how the categories within these indices were defined.

Table 4. Test of reverse causality: Do child health problems at age 3 predict later residential transitions (3-5 years)? OR from logit models

	Transitions (3-5 Years)					
	Asthma N = 4,048		Overweight/obese N = 2,148		Worse Health N = 4,048	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Health problem at age 3	1.02	0.99	1.07 *	1.04	1.01	1.02
Baseline family structure (bio. parents living apart omitted)						
Biological parents cohabiting at birth	0.95 *	0.94 *	0.96	0.95 ^	0.95 *	1.00
Biological parents married at birth	0.82 **	0.81 **	0.84 **	0.84 **	0.82 **	0.80 **
Health problem X baseline family structure						
Health problem X cohabiting at birth	-	1.05	-	1.08	-	0.97
Health problem X married at birth	-	1.07	-	0.98	-	1.01

** p<0.01; * p<0.05; ^ p<0.10 two tailed

Note: The sample is limited to children who lived at least half-time with their biological mothers at the time of the five-year interview. All models control for mother's age, race/ethnicity, nativity, education, family history of mental health problems, number of relationships before the biological father, impulsivity, whether she received prenatal medical care, smoked or drank during pregnancy, child's gender, birth order and low birth weight.

Appendix Table 1. Sample descriptives, *N* = 4,048 (except where otherwise noted)

Child health outcomes at 5 years		
Child overweight/obese (%), *N* = 2,142	17.2	
Child diagnosed with asthma (%), *N* = 4,048	23.5	
Mother's rating of child's overall health (%)		
Excellent	61.8	
Very good	26.6	
Good	9.5	
Fair	2.0	
Poor	0.1	
Explanatory variables		
Familial instability at 5 years, based on family structure at child's birth		
Stable married	19.9	
Unstable Married	5.0	
Stable cohabiting	15.2	
Unstable Cohabiting	20.6	
Stably without residential partner (stably single)	12.7	
Unstable Single	26.5	
Mother's race/ethnicity (%)		
Non-Hispanic white and other	24.8	
Non-Hispanic black	48.7	
Hispanic	26.5	
Mother's baseline education (%)		
Less than high school/GED	33.0	
High school diploma	31.0	
Some college or more	36.0	
Mother is US-born (%)	84.9	
Child is male (%)	52.6	
Child born at low/very low birth weight (%)	10.1	
Child is mother's first (%)	38.8	
Mother's mean baseline age (SD)	25.19	(6.04)
Mother has family history of psychological problems (%)	40.1	
Mother's impulsivity scale (SD)	2.98	(0.58)
Mother received prenatal medical care (%)	98.2	
Mother drank during pregnancy (%)	2.1	
Mother smoked during pregnancy (%)	18.6	
Mediating variables		
Maternal Parenting		
Consistently high	10.6	
Consistently medium	4.7	
Consistently low	3.6	
Decreasing	25.6	
Increasing	36.9	
Unstable	18.6	
Health Care Access and Utilization		
Consistently high	89.9	
Decreasing	4.6	
Increasing	4.9	
Familial Economic Resources		
Consistently high	15.3	
Consistently medium	7	
Consistently low	8.9	
Decreasing	24.9	
Increasing	25.9	
Unstable	18	
Maternal Support and Wellbeing		
Consistently high	14.5	
Consistently medium	8.6	
Consistently low	10.1	
Decreasing	17.6	
Increasing	32.5	
Unstable	16.7	

Note: Sample size for overweight/obese is smaller than total sample because this information was only collected from mothers included in the In-Home supplemental survey.