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Match quality and maternal investments in children

Erin K. Fletcher

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Abstract Marriage advocates contend that the unstable environment caused by divorce can have adverse effects on children's educational and behavioral outcomes. However, the assignment of poor outcomes to the divorce itself fails to take into account relationship quality and heterogeneity in place before or in the absence of union dissolution. I explore the link between heterogeneity of relationship quality and investments in children by showing that women who report less satisfaction in their relationships spend less time reading with their children. I test various theoretical mechanisms by which we would expect women to decrease their investments in a child using information about the match including reported argument frequency and whether the union dissolves. The results suggest that subjective measures tell a more complete story about investments in children than indicated by future union status, argument frequency or parental quality.

Keywords Investments in children · Match quality · Intelligence

JEL Classification J12 · J13 · D13

1 Introduction

It is widely believed that parents' early investments in children and home environments exert a significant effect on performance in school and on subsequent tests of intelligence (Datcher-Loury 1998; Haveman and Wolfe 1995; Hargrave and Senechal 2000; Raikes 2006). In addition, unobservable, family- and mother-level characteristics are associated with differences in achievement (Fink and Mukherjee

E. K. Fletcher (✉)
Lafayette College, Simon Center 100, Easton, PA 18042, USA
e-mail: fletchee@lafayette.edu

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2007).[1] Stability of parental presence has been shown to have significant effects on a child's cognitive outcomes and children from single-parent families are more likely to drop out of high school, experience teen births and are less likely to go to college than children living with two parents (Craigie 2008; McLanahan and Sandefur 1994). Even though a causal link between divorce and adverse outcomes is not firmly established, there is an apparent interdependency between child quality and union duration (Ermisch and Francesconi 2001; Brown and Flinn 2007).

In this literature, whether a couple stays together is considered a sufficient proxy for happiness and stability. The married-divorce dichotomy ignores significant heterogeneity within couples, so I use subjective measures to represent happiness and anticipation of union dissolution, linking to changes in investments in children. This analysis rests on the fact that the significant uncertainty associated with divorce and post-divorce incomes prompts anticipatory behavioral changes in labor supply and time spent with children, which is supported by the findings Johnson and Skinner (1986) and Ananat and Michaels (2008), for example.

This is the first paper that empirically links subjective match quality, or the perception of the quality of one's relationship, to the amount of time spent with a child. I show that mothers who rate their relationships highly are 10–24 % points more likely to report reading 7 days per week.[2] Put another way, the average woman in the sample with an "excellent" rating reports reading activities 1–2 days more per week than a mother with the same characteristics who rates her romantic relationship as "good." Estimates for children of ages 1, 3 and 5 years are statistically significant and robust to the inclusion of comprehensive controls for mother, father, and child characteristics. I explore a number of potential theoretical mechanisms for this difference and test them by exploiting the longitudinal design of the Fragile Families and Child Wellbeing Study. The primary implication of this study is that there is a broader range of quality within romantic unions that may affect the child's welfare before divorce or union dissolution occurs—if ever. I also include mother–father pairs that are unwed—important given the growing demographic of unwed parents—and additional variation in the outcome variables not captured by dichotomous variables. This is the first paper in this literature to include a large sample of unmarried mothers and to examine happiness over and above the marriage-divorce decision.[3]

This study does not establish a causal link between marital happiness and investments in children. Rather, I aim to raise a novel question, present analysis at the frontier of research given the available data, and acknowledge that there is room for development of these ideas. There are significant threats to identification, which I attempt to ameliorate. First, mother–father pairs are endogenously matched and preferences for investing in children likely represent part of why couples persist or

[1] Haveman and Wolfe (1995) present a comprehensive review of the literature on how divorce, separation, income, presence of reading materials, and numerous other home characteristics affect outcomes later in life such as educational attainment and earnings.

[2] Mincy et al. (2005) present a theoretical model showing how investments in children may increase when non-resident fathers provide a higher "quasi-wage" to mothers.

[3] Schmierer (2010) shows that anticipation of divorce results in fathers decreasing time spent with children, but no effect for mothers. He does not examine unwed parents.

break up (Ackerberg and Botticini 2002). Conversely, children, their successes, and their response to activities such as reading likely contribute to marital happiness, creating an endogeneity problem. I deal with this endogeneity as well as the data can allow by conditioning on pre-birth variables and rely on the fact that the measure of subjective match quality is fairly stable for individuals over time, regardless of whether a union dissolution is observed in the data (Bellemare 2012; Heckman and Hotz 1989).

Separately, observed correlations between parental happiness and investment behavior may be due to individual, person or family-specific characteristics and not relationship quality (see, for example, Akashi-Ronquest 2009). It may be that parents with lower preferences for investing in their children form unhappy relationships and thus we see that those who rate their relationship lower are the ones who are investing less in their children. To address the unobserved heterogeneity, I include a rich set of controls for pre-treatment behaviors including, prenatal investments in the child, estimation of the father's character, and a measure of baseline match quality.

2 Theoretical mechanism

While there are many explanations why mothers would decrease time spent with their children given poor match quality. I present three reasons, which, to some extent, can be tested using these data. This is primarily a story of opportunity costs.[4]

First, due to the time constraint, I posit that couples who argue more substitute spending time with their child for bargaining amongst themselves. In the data, couples who argue more rate their relationships lower on average. An alternative explanation is that women who are unhappy in their relationships change their behavior in anticipation of union dissolution. Women who anticipate dissolution are more likely to spend time investing in themselves—taking a class, going to the gym, returning to the workforce, or increasing work hours—because the opportunity cost of not investing in one's ability to provide for self and family, either through future match potential or employment, becomes higher. With a time constraint, this uncertainty might result in decreased time investments in children.

As a corollary, we can view children as a public good in which both parents invest and receive utility.[5] Union dissolution diminishes the value of the child as public good through decreased time spent with the child and by decreasing future returns such as care in old age. As a result, anticipation of the union's dissolution would cause a decrease in investment in the child due to a decreased potential future benefit stream. I am unable to distinguish whether the anticipation effect is a result of the public goods argument or the investing more in one's future match quality argument; likely, it is some combination.

[4] Datcher-Loury (1998) shows that higher opportunity costs decrease maternal child care time and that there is great variation in the quantity and quality of time inputs among mothers, even among those with similar levels of education.

[5] Becker and Lewis (1974) present a framework for which investments in children are considered a public good, or a "family good."

There is the possibility of an effect in the opposite direction, whereby poor match quality results in more time spent with children. In the case where you have very high quality parents, poor match quality might be perceived as affecting the child and thus parents would strive to spend more time with the child to compensate. If this effect is strong, the estimated coefficients on match quality are biased downward. Though parental quality is essentially unobservable, I control for parents' characteristics to mediate this bias.

3 Data and descriptive statistics

The Fragile Families and Child Wellbeing Study (Fragile Families) is a five-wave, longitudinal data set collected to facilitate the study of issues within "non-traditional" families, which includes unmarried parents, blended families, and single parents. It consists of a representative sample of women living in 20 large cities in the United States who gave birth in 1998, 1999 or 2000 and a significant oversample of unwed and minority mothers. The initial selection and survey was conducted in hospitals at the birth of the child. Follow-up surveys were conducted one, three, five years after birth of the child with the mother and father, individually and over the phone.[6] They include questions about parent and match quality as well as how time is spent with the child.

3.1 Sample

For this paper, I employ the baseline and follow-up surveys of the Fragile Families and Child Wellbeing data as administered to the mother of the child when the child lives primarily with her. In addition, romantic involvement must be declared at birth. This includes both mothers who are married and unmarried to the father of their child.

I create three distinct samples. The "1-year sample" consists of all women in relationships with the father of the focal child at the child's birth and at the time of the 1-year follow-up survey. For specifications estimated using this sample, characteristics such as whether the child is ever in someone else's care, earnings, and in particular, subjective match quality are measured as they are reported at the 1-year follow-up survey. This sample has 1,902 observations.

The second group is termed the "3-year sample" consists of all women in relationships with the father of their child at birth, around the child's first birthday, and around the child's third birthday. In other words, it is made up of respondents from the 1-year sample minus any respondents who report having separated or divorced her spouse or otherwise dissolved the romantic relationship with the child's father since the first follow-up survey. There are 1,382 women in this group. It should be noted that this and the"5-year sample" sample decrease in size for two reasons. One, there is some survey attrition, though it is considered low in the

[6] Though the 9-year follow-up survey is available, a change in sampling design lead to a significantly decreased response rate for the variables of interest and thus too small of a sample size to include here.

Fragile Families overall. Two, participants who are in the 1-year sample but not the 3-year are dropped due to having ended their romantic relationship with the child's father and their experience falling outside of the parameters of this study.

The "5-year sample" consists of 1,087 women who are in a romantic relationship with the father of their child during each of the examined waves. Table 1 summarizes the samples.

Summary statistics for the three samples are in Table 2. The differences between these groups are small, but those who remain in a relationship with the child's father over a longer period tend to be slightly more educated and older at the birth of the child. They are more likely to be white and to have sought prenatal care earlier in the pregnancy. They are less likely to have collected unemployment or received public assistance at the time of the child's birth and less likely to have used drugs, cigarettes or alcohol during the pregnancy.

3.2 Measures of match quality

The Fragile Families data include a number of unique measures of match quality. The primary variable of interest is mother's estimation of relationship quality, but I also add controls for a baseline measure of quality measured by whether the couple is married, their reported chances of marrying if unmarried, frequency of arguments and whether the relationship ends in a future wave.

Mothers' report of relationship quality is measured in the three follow-up surveys with the question: How would you rate your relationship with child's father?: "Excellent," "Very Good," "Good," "Fair," and "Poor." Each of the responses is included in the regression analysis as a dichotomous variable with "Good" as the excluded category so coefficients should be interpreted as in comparison to mothers who report a Good relationship, other things equal.

The above question was not asked in the baseline survey. As a proxy, I include whether a parent is married at the birth of the child under the assumption that if they are married, they must have considered the match good at some point. If unmarried, the mother reports that a marriage to the child's father is "Certain," of "High" probability, "Low" probability, or a"50-50" chance.

Table 1 Alternative sampling strategy for examining anticipatory behavior

Sampling strategy summary			
Sample name	1-year	3-year	5-year
At child's birth	Married to or in romantic relationship with child's father		
By 1-year birthday	Still married to or in relationship with father		
By 3-year birthday	520 Separate, divorce, break up, or drop out	Still married to or in relationship with father	
By 5-year birthday		295 Separate, divorce, break up, or drop out	Still married to or in relationship with father
N in sample	1,902	1,382	1,087

Table 2 Average characteristics of mothers in each sample at baseline or proportion of mothers reporting a certain characteristic

	1-year	3-year	5-year
Baseline characteristics			
Mother's age	26.1	26.7	27.2
Female child	0.53	0.52	0.52
Low birthweight?	0.08	0.076	0.07
Married	0.38	0.44	0.49
Cohabiting	0.43	0.41	0.38
In public housing	0.08	0.07	0.07
Mother US born	0.83	0.81	0.80
Earnings ($1000s)	6.47	6.76	7.04
Public asst ($1000s)	0.56	0.50	0.43
Unemployment ($1000s)	0.28	0.28	0.27
Num other kids	1.10	1.10	1.07
Prenatal care	0.99	0.99	0.99
Month of first prenatal visit	2.35	2.27	2.20
Substance use during pregnancy			
Alcohol used	0.02	0.02	0.02
Drugs used	0.02	0.03	0.02
Cigarettes smoked	0.16	0.15	0.14
White	0.38	0.42	0.44
Black	0.42	0.38	0.36
Asian	0.03	0.04	0.04
Native American	0.02	0.02	0.02
Other race/ethn	0.15	0.15	0.14
Latina	0.27	0.27	0.26
Less than 8th grade	0.32	0.03	0.02
Some high school	0.23	0.21	0.19
HS Diploma	0.25	0.24	0.24
GED	0.05	0.04	0.04
Some college	0.25	0.25	0.25
Tech or trade school	0.03	0.03	0.03
BA/BS	0.11	0.13	0.15
Graduate school	0.06	0.07	0.08
N	1,902	1,382	1,087

I also measure argument frequency. In the follow-up surveys, mothers are asked how often they argue with the focal child's father "about things that are important." Answers are coded "Always," "Often," "Sometimes," "Rarely," and "Never." The questions on argument frequency were also different in the baseline survey. I employ principal components analysis to combine seven questions related to argument frequency on various topics asked in the baseline survey into a single index of baseline argument frequency.

Finally, I also consider the future status of the couple. For each wave, I determine whether the couple breaks up—separates, divorces, or the mother reports they are no longer intimately involved—and create a dichotomous variable with a value of 1 if the relationship ends and 0 if it continues. In waves where there is at least one wave following available, I can use whether the relationship ends in a subsequent wave as a additional control. More immediate union dissolutions may be better anticipated than ones far into the future and thus more likely to exert an effect.

Measures of match quality are likely affected by cultural norms and individual characteristics. Observable characteristics such as age and education level are explicitly included in the model to account for some of this variation, but it is problematic if all parents with preferences for reading to their children more also report being in good relationships. While parental quality is generally unobservable, I include observable, baseline characteristics to control for this phenomenon to some extent.[7]

3.3 Measures of investments in intelligence

I use the measure of reading days per week in the survey because reading to children is an important predictor of children's outcomes (Raikes 2006). Mothers are asked both how many days each week they read to the focal child and how many days per week the father reads to the focal child. Time spent playing inside and watching television are measured similarly. The outcome variable, thus, is measured discretely and takes values between zero and seven. Though one third to one half of the sample reports reading to their child every day of the week ($y_i = 7$), there is significant variation in the responses and they do vary over time.

It is likely that parents' investments in children's cognitive abilities are endogenous to children's displayed abilities (Brown and Flinn 2007). Children that show signs of learning more words might be read to more often, or it may be the case for children who show signs of learning fewer words. Many parents may not have an objective measure of their child's cognitive ability. However, this does not mean that they are not aware of it, only that their measure is not as readily comparable to other children's. Thus, the understanding of a child's abilities should not perfectly predict investments.

Figures 1, 2, and 3 are box plots showing that the average number of reading days reported is in fact different for mothers reporting various levels of satisfaction in their relationships. Mothers who rate their relationship as excellent report the highest number of reading days, but mothers who rate their relationship as poor report a higher average number of reading days than those who rate their their relationship as good or fair. This may be an indication that the mothers who are most likely to see their relationship ending are aware of their changing behavior and somehow attempt to compensate for it by increasing time spent with the child.[8]

[7] Heckman and Robb (1985) discuss selection on observables in non-randomly selected samples.

[8] Father's reading days is available but not included to its high correlation with mother's reading days.

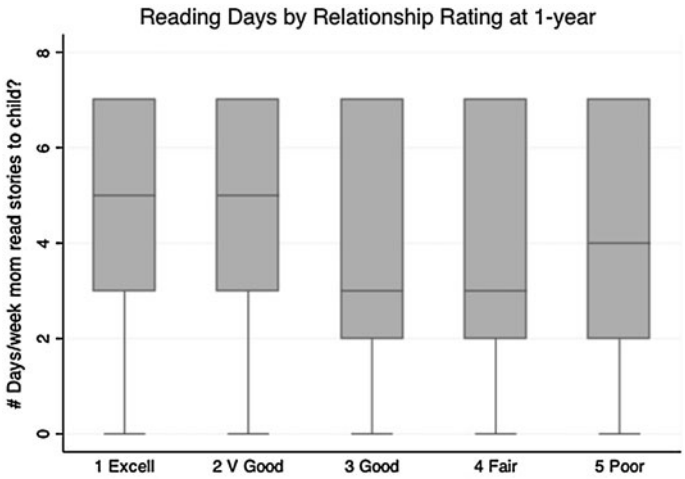

Fig. 1 Reading days by relationship rating for follow-up survey 1

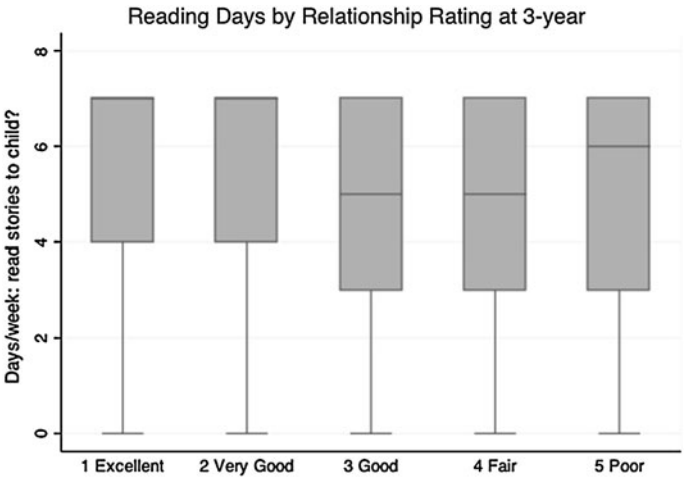

Fig. 2 Reading days by relationship rating for follow-up survey 2

3.4 Data and conceptual issues

In addition to the potential endogeneity described above, children's displayed cognitive abilities may contribute to marital happiness, which poses a significant problem for identification. Mediating this question is the fact that while there is variation in reading days, there is little variation in subjective match quality over time by couple. That is, women who report low levels of happiness or a low probability of marrying the father of their child are likely to report low levels of happiness in subsequent surveys. Still, I include controls for pre-natal investments

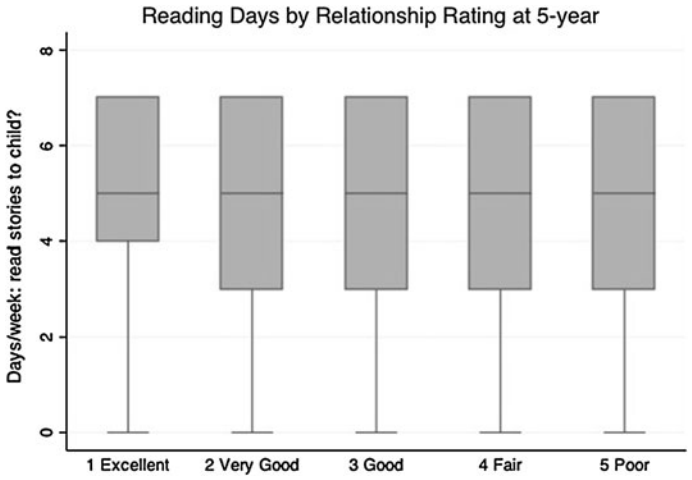

Fig. 3 Reading days by relationship rating for follow-up survey 3

to establish a baseline level of preferences for investments in the child that are not endogenous to a child's quality. This inclusion rests on the assumption that women who do not engage in risky behaviors while pregnant and get to the doctor earlier have, on average, higher preferences for investing in their children than women who do engage in risky behavior.

The ordered nature of the measured variables introduces a wide margin for error in this test. Time reading with a child is measured in days per week, for example, and frequency of arguments is coded as "Often," "Sometimes," or "Never." Though I do account for the categorical variables by creating a set of dichotomous variables for each answer, the result is that the magnitudes are somewhat difficult to interpret and may be biased.

The best model to estimate given the outcome measure of days per week is not immediately apparent. Count models, such as the Poisson or Negative binomial, are appropriate in situations where the count is very clearly taken for each observation, such as parking tickets. If mothers were asked to keep track of the days of the week that they read to their children each week, a count model would be appropriate. However, the design of the question, which asks respondents to estimate the number of the days per week they read with the child, implies some underlying process by which respondents recall and likely average the number of days spent reading over weeks or months. This may be related to a preference for reading with a child or an averaging of time over several days or weeks or perhaps an understanding by the respondent of what the "right" answer is. While it is clear that two days is more than one per week, the question does not make clear that two days is actually twice as many as one, or that four is twice as many as two, as a count model would require. The ordered probit model is useful for ordered, discrete outcomes, such as reading days per week, where it is assumed that there is some underlying cut-off which moves responses from one discrete outcome to each higher one. I employ a

standard ordered probit in the analysis below. Additionally, this model allows for the flexibility to show the uptick in higher average reading days for women in Poor relationships, while a count model would result in biased coefficients due to the nonlinearity.

4 Empirical strategy

4.1 Baseline specification

The baseline specification is estimated separately on each of the three regression samples: the 1-Year Sample, the 3-Year Sample and the 5-Year Sample:

$$y_i = \alpha + \sum_{j=1}^{4} \beta_j \times Q_{i,j} + X_i\gamma + \epsilon_i \tag{1}$$

where y_i indicates the number of days per week that a mother reads with her child, Q is a vector of dichotomous variables indicating subjective match quality where one of the five entries takes a value of one and the others zero. X is a vector of socio-economic and individual characteristics including race, education, mother's age and immigrant status and child's gender as well as the baseline socio-economic characteristics described above.

4.2 Direction of causation between parenting and relationship

With the baseline specification I do not effectively rule out the possibility that parents who have lower preferences for investing in children are those who get into bad relationships. In order to address this question, I add various measures of estimation of the father's personalities by the mother. Though these are not necessarily indicative of parenting quality, I control for whether a mother sees her child's father as a good or bad person. This is an attempt to control for omitted variable bias arising from the possibility that bad people or bad parents get into bad relationships.

4.3 Prenatal investments

I control for unobserved heterogeneity and mediate omitted variable bias by controlling for the mother's baseline match quality and investment in the children. Baseline match quality as measured by a combination of marital status and unmarried mothers' report of the chances of an eventual marriage is added to control for effects that child quality might have on match quality. Measures of prenatal investment include whether prenatal care was sought, the month in which the first doctor's visit occurred, whether the mother used drugs and alcohol or cigarettes during pregnancy.[9] Additionally, I control for whether the child was ever breastfed.

[9] I also tested for whether the child was of low birthweight, but the variable is sparsely populated for the relevant sample. This, combined with lack of significance on the coefficient, led me to exclude it.

The measures of a mother's prenatal investments in the child include whether prenatal care was received, at what point in the pregnancy prenatal care was sought, and behaviors such as alcohol, drug and cigarette use during pregnancy. Prenatal investments are indicated by the vector Z_i. I control for baseline match quality as measured by marital status and respondents' report of the chances of imminent marriage. Respondents report a chance of marriage as "Certain," "Good," "50-50," "A Little," or "No Chance."

$$y_i = \alpha + \sum_{j=1}^{4} \beta_j \times Q_{i,j} + \Sigma_{k=5}^{9} \beta_k \times bm_{i,k} + X_i\gamma + Z_i\psi + \epsilon_i$$

where y_i is reading days again. Z_i is a vector of controls for prenatal investments and bm_i which is a vector of dichotomous variables on marital status and chances of marriage reported at the baseline.

4.4 Argument frequency

In addition to the baseline controls, I control for argument frequency in the follow-up surveys and baseline argument frequency. As the argument frequency questions are asked differently in the baseline survey, I use principal components analysis to account for the variation in the questions posed on argument frequency at the baseline. The baseline survey asks five separate questions about argument frequency while subsequent surveys ask how often the couple argues about "things that are important" to them. I perform principal components analysis retain the first two components to use as regressors in the next specification, named $PCArg1$ and $PCArg2$:

$$\begin{aligned} y_i =& \alpha + \Sigma_{j=1}^{4} \beta_j \times Q_{i,j} + \Sigma_{l=1}^{4} \eta_l \times ArgumentFreq_{i,l} \\ &+ \phi_1 PCArg1_i + \phi_2 PCArg2_i + X_i\gamma + Z_i\psi + \epsilon_i \end{aligned}$$

4.5 Future status

Most of the literature on match quality focuses on the marginal decision of marriage or divorce and hinges on the assumption that this decision is indicative of quality of the match. This indicator is noisy and by definition is undefined for unmarried couples. As my sample includes both married and unmarried parents, I focus on the question of union dissolution as reported by the mother. The longitudinal design allows me to see couples over time to know whether the union has dissolved two or four years into the future. The extent to which parents will change their investment behaviors in expectation of future relationship status are limited to a horizon of a few years, so the data used here should span a sufficiently long timeline to show an effect, if one is present.

I repeat the baseline analysis adding measures of the couple's future relationship status for the 1- and 3-year samples. I test whether divorce affects child investments more or less than the dissolution of relationships of unwed couples by interacting marital status in that wave with future relationship status for each of the waves

available. Thus, for the specification on reading days in the one-year follow-up survey, the variable R_3 indicates that the couple was married during the 1-year follow-up survey, but separated or divorced by the time of the interview for the 3-year follow-up survey.

$$y_i = \alpha + \sum_{j=1}^{4} \beta_j I_{i,j} \times Q_{i,j} + \theta_1 R_{3i} + \theta_2 R_{5i} + \theta_3 M \times R_{3i} + \theta_4 M \times R_{5i} + X_i\gamma + Z_i\psi + \epsilon_i$$

where R_3 is a dichotomous variable that takes the value of one if the relationship ends by separation, divorce or break-up as reported by the mother in the three-year follow-up survey and zero otherwise. R_5 is a similar indicator, taking a value of one if the relationship ends by the five-year follow-up survey. I also include an interaction term for whether the respondent is married and divorces to test for differences in partnerships by whether the mother-father pair ever married. The preceding specification is for the days per week spent reading as measured in the 1-year follow-up survey. The specification for the 3-year Sample is as above but without variables R_3 and $M \times R_3$.

5 Results

5.1 Marginal effects

As the output of an ordered probit specification are not directly interpretable, Table 3 presents predicted outcomes for two average respondents, one married and one unmarried at baseline, varying the match quality variable. The representative respondents are defined by the average values for a married and unmarried respondent and the most probable of those values when the value is categorical.[10] Table 3 shows, for each of these representative women, how changing her answer to the relationship question correlates to answers on the number of days spent reading to her child per week (y_i). The predicted values reported in Table 3 reflect the coefficients calculated for the regression specifications labeled (2), (4) and (6) in Table 4.

For these two representative women from the primary sample, changing each woman's relationship rating with their child's father to "Excellent" from "Good" changes her predicted reading days by 1 or 2 more per week, or 7 days in a week versus 6. Though much of the results seem to be driven by individuals who rate their relationships as excellent—and this is the statistically significant difference—, individuals who rate their relationship more highly read more, on average, to their children on a weekly basis than those who report dissatisfaction in their relationships. Like the original descriptive box plots above showed, there is a

[10] Given the heterogeneity of the sample, the number of dichotomous variables, and the large oversampling of non-marital births, I calculate the marginal effect for two representative agents rather than at the average.

Table 3 Predicted outcomes from ordered probit showing predicted number of days spent reading with focal child per week for two representative respondents in the 5-year sample, varying relationship quality

Effect of varying subjective match quality on $\hat{y_i}$, or predicted days per week that mother reads with child						
	Married 1 year (days)	Unmarried	Married 3 years (days)	Unmarried	Married 5 years (days)	Unmarried
Excellent						
$\hat{y_i}$	5	3	7	6	7	7
Very good						
$\hat{y_i}$	4	3	5	5	6	5
Good						
$\hat{y_i}$	4	3	5	5	5	4
Fair						
$\hat{y_i}$	3	3	5	5	5	5
Poor						
$\hat{y_i}$	6	4	5	5	6	5

slight uptick in reading days when assigning a woman a different report from "Fair" to "Poor," but only in the first follow-up survey, not in subsequent ones. This supports the idea that mothers who see their relationships as particularly stressful may be compensating by spending more time with the child, either in hopes of spending less time with the partner or in an attempt to soothe the child.

Alternatively, ordered probit coefficients can be translated into marginal effects. In the first follow-up survey, the coefficient on Excellent of 0.278 translates to a mother reporting an excellent relationship being about 10 % points more likely to read 7 days per week to her child than a mother reporting a good relationship. By the third follow-up survey, this change is approximately 24 % points and statistically significant. The coefficient on poor in the first wave is statistically significant and translates to a 27 % point increase over those reporting good, but this effect is estimated using <1 % of mothers in the sample and thus is highly suspect. Other key results are that male 1-year olds are about 5 percentage points less likely to be read to 7 days per week and mothers reporting no chance of getting married are 20 percentage points less likely to read 7 days.

The results are robust to the inclusion of controls for individual characteristics, socio-economic status, race and prenatal investments. Controlling for whether the child is ever in someone's care besides the mother's, though exerting a significant effect, does not affect the magnitudes of relevant variables, nor does inclusion of characteristics of the mother at the baseline, including her own reports of prenatal care, economic status and prenatal behaviors, though individual coefficients occasionally come in as significant.

Table 5 reports identical specifications for the samples that decrease in size over the longitudinal survey due to relationship dissolution. The advantage of examining this sample over a sample that can be compared across the time periods is that it represents a larger proportion of unwed mothers and mothers whose relationships are more liable to end. Differences between the results reported in Table 4 are

Table 4 Unweighted ordered probit results for reading days on subjective match quality for the 5-year sample (in a relationship with the father from birth through the child's fifth birthday) in three follow-up waves

Reading days on subjective match quality						
Days per week that mother reads with child						
	(1) 1-year	(2) 1-year	(3) 3-year	(4) 3-year	(5) 5-year	(6) 5-year
Excellent	0.28*** (0.10)	0.28*** (0.10)	0.34*** (0.11)	0.31*** (0.11)	0.63*** (0.10)	0.62*** (0.10)
V. good	0.03 (0.10)	0.04 (0.102)	0.14 (0.10)	0.12 (0.102)	0.30*** (0.09)	0.29*** (0.09)
Fair	−0.30* (0.17)	−0.21 (0.17)	−0.02 (0.18)	−0.00 (0.18)	0.17 (0.15)	0.18 (0.15)
Poor	0.47 (0.40)	0.70* (0.42)	−0.34 (0.63)	−0.36 (0.63)	0.31 (0.33)	0.29 (0.33)
Married at birth or chances of marriage at birth[a]						
Married		−0.15 (0.54)		−0.02 (0.15)		−0.09 (0.11)
A little		0.57* (0.31)		−0.49 (0.31)		−0.24 (0.28)
Fifty/fifty		−0.09 (0.13)		−0.22 (0.14)		−0.10 (0.132)
Good		−0.0517 (0.12)		−0.20 (0.13)		−0.10 (0.12)
None		−0.70*** (0.27)		−0.79*** (0.29)		−0.25 (0.25)
Baseline	No	Yes	No	Yes	No	Yes
Education	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,066	1,066	1,057	1,057	1,087	1,087

[a] Includes controls for number of kids, prenatal drug and alcohol use, doctor's visits, public assistance, race, earnings, child sex

Good is excluded category

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5 Unweighted ordered probit results for reading days on subjective match quality for the 1-, 3-, and 5-year samples

Reading days on subjective match quality						
Days per week that mother reads with child						
	(1) 1-year	(2) 1-year	(3) 3-year	(4) 3-year	(5) 5-year	(6) 5-year
Excellent	0.40*** (0.07)	0.41*** (0.07)	0.35*** (0.09)	0.34*** (0.09)	0.63*** (0.10)	0.62*** (0.10)
Very good	0.20*** (0.07)	0.21*** (0.07)	0.16* (0.09)	0.15* (0.09)	0.30*** (0.09)	0.29*** (0.09)
Fair	−0.08 (0.10)	−0.07 (0.11)	−0.11 (0.13)	−0.11 (0.135)	0.17 (0.15)	0.18 (0.15)
Poor	0.05 (0.21)	0.12 (0.21)	−0.29 (0.30)	−0.30 (0.30)	0.31 (0.33)	0.29 (0.33)
Baseline	No	Yes	No	Yes	No	Yes
Education	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,902	1,902	1,382	1,382	1,087	1,087

Robust standard errors in parentheses

Good is excluded category

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

small. In the expanded sample, a higher relationship rating is correlated with a larger change in the number of reading days and is significant for smaller changes in quality. In each of the waves, both excellent and very good relationships are associated with more reading days in a statistically significant manner. This translates to changes in predicted outcomes that are similar in magnitude to the primary sample as reported in Table 3.

The addition of controls (not shown) for mother's estimation of the father's character is not associated with any effect on the number of reading days in the same way that estimation of the relationship quality does. Mothers who report that their partner is "often" or "sometimes" "fair and willing to compromise" do not report significantly different reading frequencies than those who report that their partner is "never" "fair and willing to compromise." The null results on father quality could be interpreted as a rejection of the hypothesis that bad parents are necessarily those who get into bad relationships. Mothers seem to invest less in their children if they see the relationship as ending or if they are unhappy in the relationship, but not necessarily if they see their partner as having significant, observable character flaws.

5.2 Results on argument frequency

Results on argument frequency are inconclusive. The signs are mostly as predicted, but point estimates are not significant. In the 3-year sample, the variable "Argue Never" is dropped for multicollinearity in addition to "Always" being the excluded category. This may mean that argument frequency and subjective match quality are measuring different unobservable characteristics that are correlated. In any case, I cannot show that mothers who argue more with their child's father spend more or less time reading with their child. Match quality variables, however, remain significant for the 3-year sample. See Table 6 for results.

5.3 Results on future status

Future relationship status is correlated with a small, but measurable effect on mother's reading days (Table 7). Mothers whose relationships end spend on average about 1 day per week fewer reading with their child. This effect is jointly significant with the coefficients on subjective match quality. When controlling for future relationship status, the coefficients on match quality are close in magnitude to the baseline estimates. Future relationship status does not fully account for differences in investments in children and anticipation of union dissolution measure an effect over and above the baseline effect.

There may be some confounding effects because the sample consists of both couples that are married and unmarried. It is likely that the costs of ending a marriage are different than the costs of ending a relationship that may or may not have legal ties, which may, in turn, affect investments. Thus, I include an interaction between marital status and future relationship status. This coefficient is small in magnitude and not statistically significant for married couples that divorce before the 3-year follow-up survey. There is a differential effect, however, for married respondents whose relationships end by the 5-year follow-up survey. These results show a positive

Table 6 Ordered probit results for reading days on subjective match quality and argument frequency

Reading days on argument frequency				
Days per week that mother reads with child				
	(1) 1-year	(2) 1-year	(3) 3-year	(4) 3-year
Argument frequency				
Always	0.42* (0.22)	0.35 (0.22)	0.11 (0.22)	0.05 (0.22)
Often	0.01 (0.13)	0.03 (0.13)	−0.04 (0.11)	−0.05 (0.11)
Rarely	0.10 (0.08)	0.10 (0.08)	0.18** (0.08)	0.18** (0.08)
Never	0.33* (0.19)	0.31 (0.19)		
Subjective match quality				
Excellent	0.36*** (0.11)	0.37*** (0.11)	0.33** (0.16)	0.21** (0.11)
Very good	0.14 (0.10)	0.145 (0.11)	0.17 (0.16)	0.06 (0.10)
Fair	−0.11 (0.17)	−0.05 (0.18)	−0.07 (0.17)	−0.07 (0.17)
Poor	0.32 (0.42)	0.60 (0.44)	−0.50 (0.35)	−0.54 (0.35)
Married at birth or chances of marriage at birth				
Married		0.51 (0.56)		0.73** (0.30)
A little		1.35*** (0.35)		0.46 (0.37)
Fifty/fifty		0.65** (0.27)		0.62** (0.28)
Good		0.67** (0.27)		0.59** (0.28)
Certain		0.73*** (0.27)		0.76*** (0.27)
Baseline controls	Yes	Yes	Yes	Yes
Observations	982	982	1,100	1,100

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

combined effect on reading days for married parents whose relationship ends, suggesting there may be something different about married respondents who eventually divorce.

5.4 A note on sample weights and heterogeneous results

The Fragile Families dataset is unique in that it oversamples a previously understudied group, single mothers. This increased attention means that the sample is not representative of the US population, decreasing external validity and complicating interpretation of policy implications. The models were estimated both with and without the national weight as provided. The weighted results are not shown in the interest of space.

Inclusion of the weights decreases the importance of subjective match quality and interestingly, often increases the significance of objective measures of match quality. While the quality of the match appears to be important for reading days regardless of the marital status of the average group member, the type of measure that most appropriately predicts reading days is different for different groups.

Table 7 Unweighted ordered probit results for reading days on subjective match quality and future relationship status

Reading days on future relationship status				
Days per week that mother reads with child				
	(1) 1-year	(2) 1-year	(3) 3-year	(4) 3-year
Rel End 3-year	−0.01 (0.07)	0.01 (0.07)		
Rel End 5-year	−0.53** (0.22)	−0.51** (0.22)	−0.50* (0.28)	−0.50* (0.28)
Married × Rel End 3-year	−0.53 (0.38)	−0.58 (0.38)		
Married × Rel End 5-year	2.90*** (0.57)	2.99*** (0.69)	10.16 (0.35)	0.14 (0.35)
Subjective match quality				
Excellent	0.42*** (0.07)	0.42*** (0.07)	0.35*** (0.089)	0.33*** (0.089)
Very good	0.22*** (0.07)	0.22*** (0.07)	0.15* (0.08)	0.14 (0.09)
Fair	−0.06 (0.10)	0.07 (0.10)	−0.06 (0.31)	−0.07 (0.31)
Poor	0.03 (0.22)	0.19 (0.22)	−0.25 (0.30)	−0.24 (0.31)
Male child	−0.08 (0.05)	−0.09* (0.05)	−0.01 (0.06)	−0.01 (0.06)
Married in wave	0.04 (0.16)	0.02 (0.65)	0.29 (0.18)	0.35 (0.31)
Log earnings	0.11 (0.02)	0.01 (0.02)	−0.00 (0.02)	−0.01 (0.02)
Married at birth or chances of marriage at birth				
Married		0.39 (0.35)		0.62** (0.26)
Certain		0.48*** (0.18)		0.58** (0.24)
Good		0.53* (0.18)		0.38 (0.25)
Fifty/fifty		0.43** (0.18)		0.36 (0.25)
A little		0.86*** (0.22)		0.47 (0.33)
Observations	1,902	1,902	1,384	1,384

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In the weighted regressions, argument frequency and future status are more significant and larger when compared to the unweighted sample. The standard errors on match quality increase, though the magnitudes do not change significantly. The reasons for this switch are unclear. Perhaps married mothers are more likely to revise upward their estimation of their marital happiness, so we do not observe their true estimation of match quality, but an upwardly biased one. If married women are more likely to lie about their happiness then we would see no effect on reading days.

6 Robustness checks and extensions

6.1 Quality of time spent with children

It is unclear whether there is something about reading that makes it especially sensitive to match quality. It may be that happier parents are more likely to report

more of any child-intensive time activity. I estimate the baseline specifications using alternate outcomes of days per week that a child watches television and days that mothers play inside with their children. While these activities are time intensive, they are not necessarily investments in children's cognitive abilities, as reading is. Television days are only available for the 5-year follow-up survey and days playing inside is available for each of the samples. The coefficient on match quality is insignificant in all specifications, indicating that subjective match quality is not associated necessarily with all time spent with children.

7 Conclusions

This research shows that a mother's subjective assessment of the quality of her relationship with a child's father is a predictor of how much time she will invest in her children's cognitive abilities when there is significant space for variation–i.e., children are of an age where reading is enjoyable and appropriate but before schooling provides structure and thus instructions to read. These results are robust to the addition of controls for several individual characteristics that account for parental quality, cultural norms, and socio-economic status, which serve to mitigate possible endogeneity and unobserved heterogeneity problems. Mothers who report an excellent relationship with the father of their child spend up to 2 days more per week reading with the child than a mother who reports a merely good relationship with the father. The results support other evidence that relationship discord can have an indirect impact on children through how it affects their parents' decisions to invest in their children. That these effects might be in place before or even in the absence of divorce or union dissolution reflects a unique and as yet uncovered, if somewhat logical, insight. This effect is not identified causally in this study, highlighting the need for further research in this area.

I test some of the theoretical explanations for how match quality could affect parental investment decisions. I find that argument frequency does not have a significant direct association with reading to children. A decrease in reading to children is not observed with an increase in reported argument frequency. The correlation between argument frequency and subjective match quality likely affects these specifications and merits further investigation.

A mother whose union dissolution is imminent does differ significantly from others in her report of reading. The effect is over and above the effect of a mother's estimation of her match quality. While this suggests that anticipation of divorce might be a driver of investment behavior, and that researchers might be able to use subjective match quality to predict levels of investments in children, but it should not be used to predict future relationships status. The union dissolution decision, while important, does not fully encompass the range of satisfaction or happiness in an intimate relationship. Those gradations in satisfaction are associated with significant differences in parents' behaviors, investments in children or otherwise, within the relationship.

This finding could be explored more to examine the link between match quality and other behaviors such as investments in health or education. Further research is needed to examine a link, if any exists, between match quality and children's cognitive abilities as well as a link between match quality and time spent on other activities and monetary investments.

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