The Hedonic and Time-Use Consequences of Parenthood

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ABSTRACT

We examined the hedonic and time-use consequences of parenthood with a novel dataset of in-the-moment mood and emotion spanning 3,867 subjects and 1.1 million observations. Contrary to most prior research, we find evidence for a statistically significant and large increase in both mood and net emotion for mothers but not fathers. Analysis of time-use data suggests that 30% of the observed gender difference in how parenthood affects mood, and 42% of the difference in net emotion, may be attributable to differences in how mothers and fathers allocate their time. Using a rich set of individual characteristics, we demonstrate the robustness of the effect across varying specifications intended to control for cross-sectional differences and we find that those with an abundance of social and financial resources exhibit the strongest hedonic benefits from parenthood. We speculate that because time-spent with children is actually mood-increasing for fathers as well as mothers, the existence of a focusing error may reconcile our results with prior findings from prospective and retrospective evaluations.

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INTRODUCTION

The prevailing view from decades of research is that children do not improve the long-run well-being of their parents (see 1-3 for a review). This poses a puzzle for both theoretical and practical accounts of why so many people have children. In this paper, we provide novel evidence from a large and unique dataset on the hedonic effects of parenthood and the time-use channels through which children appear to influence well-being.

In assessing a prior literature characterized by varying research designs, elicitation measures, and econometric approaches, one central pattern has been the predominant use of retrospective (e.g. "How happy were you this year?") and reflective (e.g. "Taking all things into consideration, how satisfied are you with your life right now?") measures of well-being. Despite their widespread use, many have noted that these measures are far from perfect. Retrospective reports of emotion are potentially subject to biases due to imperfect recall (e.g., 4, 5), while evaluative judgments are further subject to the influence of comparison standards (6), experimental context (7) and lay theories of happiness (8).

We reassess the hedonic consequences of parenthood with a unique dataset that documents 1.1 million moments of reported well-being, emotions, and time-use of 3,867 diverse adult participants every 30 minutes over a 10 day-period. These instant assessments of mood (i.e., "How did you feel [during the previous 30 minutes]?") may be the most direct reflection of experienced-utility (9) and are less prone to many of the problems associated with reflective and retrospective assessments. Though not a methodological cure-all, in-the-moment measures of mood correlate well with physiological markers (e.g., 10) may be less sensitive to scale adaptation (11), and provide ecologically valid evidence outside the typical laboratory and survey paradigms (12). Only one prior study of which we are aware uses "experience sampling" to explore the link between children and well-being (13). Our study substantially improves upon this work with a far larger (N = 3,867 and n = ~1.1 million as compared to N = 329 and n = 6,763) and more diverse sample (the prior study involved mainly elderly participants with mean age of 57).

Consistent with some prior work, our analysis of mood reveals no overall effect of children on parental well-being. However, this masks a positive and significant effect of children on mothers, and a smaller negative and insignificant effect of children on fathers (this gender difference is significant). To appreciate the magnitude of our estimates, consider that the influence of children on mothers is larger than one of the most robust effects identified in the well-being literature and corroborated by our data—the hedonic premium associated with marriage (1). Our data additionally contains hundreds of individual level demographic and lifestyle characteristics, and we leverage these variables to carefully address possible problems of selection raised by other researchers (e.g., 1,14). Our basic findings are highly robust to specification and are manifest in the unconditioned correlations. To our knowledge, this is the first evidence in the literature that children may provide significant hedonic benefits to their mothers.

Using the rich individual characteristics available, we also explore the complicated heterogeneity that characterizes parenthood. Prior studies have found that the effects of parenthood vary across sub-groups with particularly negative effects for single parents, parents with older children, and poor households and more positive effects for older and more educated parents (see 1- 3 for a review). Our analyses suggest that those with an abundance of financial and social resources benefits most from parenthood. We also

use a propensity score to predict the likelihood of having children, and find that fathers with a low predicted likelihood experience the strongest negative returns to parenthood. This suggests that parents may be sophisticated in their decisions to have children.

Why might children improve the well being of mothers, but not fathers? Our data on time-use provide insight into the mechanisms through which children influence parental well-being. Specifically, the data allow us to decompose the effect of parenthood into how parents spend their time, and how much they enjoy spending time across time-use categories. This exercise provides a surprising explanation for the differential effect of children on mothers and fathers. Parents devote considerable time to their children, and this time is associated with heightened well-being for *both* mothers and fathers. However, because fatherhood is associated with less time with children, family and friends but more time at work than motherhood, motherhood appears to be far more hedonically beneficial. To illustrate the importance of time reallocation in explaining the hedonic effects of parenthood, we estimate that the time-use difference between mothers and fathers accounts for approximately 30% of the overall gender difference in mood associated with parenthood.

Beyond exploring the effects of parenthood on mood, our results permit us to investigate the emotional consequences of being a parent. Using in-the-moment assessments of 17 emotions collected through our survey instrument, we find a similar gender difference in an analysis an index of net emotion suggesting coherence across multiple measures of well-being. As with mood, we estimate that a significant share, 42%, of the observed gender difference is attributable to differences in how mothers and fathers allocate their time. Looking at how parenthood influences each discrete emotion for which we have data, fathers fare worse than mothers in an analysis of happiness, sadness, love, worry, exhaustion and overwhelmedness; we find no notable effects of parenthood for other emotions such as anger, boredom, confidence and relief; and find an unexpected negative association between motherhood and contentedness and hope. While these analyses are subject to statistical and conceptual cautions, they represent, to our knowledge, the first documentation of parenthood and specific emotion using an experience sample.

METHODS

Participants. Our proprietary data was collected by a consumer behavior/marketing firm in order to provide client firms with insights into the hedonic, time-use, and purchasing patterns of a diverse set of adult individuals.[1] This data is unique in its size, scope, and unusually high rate of compliance. The panel comprises 3,867 U.S. adults who were recruited in-person or by phone from a larger representative study sample. Recruitment occurred in four waves of approximately 1,000 participants each and with incentives of $150 (first wave), $125 (second wave), and $100 (third and fourth waves). While low participant compliance has been cited as a potential disadvantage with experience sampling (12), missing data in our study are surprisingly rare. The sample includes 37,982 total person-days and only 374 person-day "gaps" (i.e., missing observations within stretches of recorded data)[2].

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[1] The survey is called "USA TouchPoints" is administered by RealityMine.
[2] Of the 1,126,113 person-half-hours in the sample, there are only 1020 person-half-hour gaps.

The final sample, while not strictly representative of the US population, reflects a wide diversity of adults in terms of gender (49% female, 51% male), age (M = 43.8, SD = 12.3), race (75% white, 13% black, and 12% other), marital status (55% married, 45% not married), parenthood (42%), employment status (58% full-time, 14.0% part-time, 28% not employed), educational attainment (5% no high school, 19% high school, 36% some college, 26% college graduates, 14% some post-college), and annual household income (median category = $60K to $75K, SD from salary-midpoints = $56k).

Protocol and Measures. The study was administered using a smart-phone application which prompted participants to report both hedonic and time-use information every waking half-hour for 10 consecutive days between 2010 to 2012 (participants either used their own phone, or were given one for the purpose of the study). Each 30 minutes, a succession of screens required participants to record how (e.g., cooking, working, travelling, relaxing), with whom (e.g., partner, friends, coworkers, children), and where the participant was spending his time. We note that a key time-use variable for the study—time spent with children—does not refer exclusively to one's own children but rather children generically so that we observe non-parents who nevertheless report a small amount of time-spent with children. The application then elicited the participant's mood (1 = "Bad Mood", 3 = "Neutral", 5 = "Good mood"), level of arousal (1 = "Relaxed", 3 = "Neutral", 5 = "Alert"), and the presence of one (or more) of 17 specific emotions (indicated by a series of stylized labeled pictographs).

A separate module, administered at the end of each day, captured additional online and purchasing behaviors, while two surveys administered prior to the study included hundreds of measures capturing participant demographics, lifestyle, and attitudes.[3] All told, our data captures 1,126,113 observations of subjective experience and time-use outcomes.

Defining Parenthood. We defined the primary independent variable of interest, parenthood, as 1 in every instance in which a respondent indicated living with their child, under the age of 18, and 0 otherwise. To avoid classifying large shares of respondents with older children out of the household as non-parents, we leverage additional knowledge of grandparental status from the surveys to exclude 738 grandparents from the primary analysis. We discuss the well-being of grandparents briefly in the conclusion. In a robustness check, unreported here, we implement alternative definitions of parenthood inferred from the parenthood indicator and time-use variables, and our results are qualitatively unchanged. Table 1 summarizes demographic and time-use statistics for the sample (here, excluding grandparents). We combine both data sources to determine parental status and discuss inferences made for the few cases that did not provide completely unambiguous information in the SOI.

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[3] Specifically, there were two survey instruments used in the data. A first is a large instrument with several hundred variables that was collected in a period a few months to 2 years prior to the treatment period (GfK MRI American Panel). The second survey is a recruitment survey collected by the firm immediately prior to the treatment period. Most time-variant characteristics were coded from the recruitment survey.

	All	Men	Women	p-value of gender diff
	Panel A: Mean of Demographic and Well-Being Variables			
Demographic Variables				
Male	0.52	1.00	0.00	--
Age (years)	40.9	41.0	40.8	p = .58
	(11.7)	(11.9)	(11.4)	
Married	0.55	0.56	0.54	p = .27
Employed	0.75	0.80	0.69	p < .01
Black	0.12	0.11	0.12	p = .51
College	0.35	0.35	0.36	p = .40
Presence of Children	0.49	0.43	0.55	p < .01
Household Income ($1000s)	84.6	89.6	79.2	p < .01
	(57.9)	(59.8)	(55.2)	
Well-Being Variables				
Mood	3.86	3.88	3.84	p < .05
	(.56)	(.56)	(.56)	
Net Emotions	0.81	0.85	0.76	p < .01
	(.69)	(.73)	(.65)	
	Panel B: Mean of Time-Use Variables			
Time-Use Variables				
Own	0.41	0.46	0.36	p < .01
	(0.49)	(0.50)	(0.48)	
Partner	0.28	0.28	0.27	p = .67
	(0.45)	(0.45)	(0.45)	
Children (including Child Activities)	0.26	0.19	0.33	p < .01
	(0.44)	(0.39)	(0.47)	
Family & Friends	0.16	0.15	0.17	p < .01
	(0.36)	(0.35)	(0.37)	
Work	0.22	0.26	0.19	p < .01
	(0.42)	(0.44)	(0.39)	

Table 1. Table displays sample means and standard deviations for relevant demographic, well-being and time-use variables.

EMPIRICAL STRATEGY AND RESULTS

Mood and Parenthood

We first examine the relationship between mood and the presence of children in the household by estimating a model of the following form at the participant-level:

$$\overline{Mood}_i = \alpha + \gamma Parenthood + X\varphi + \varepsilon_i$$

where $\overline{Mood}_i$ denotes the average mood of participant i across the sample period and X is a vector of covariates that control for marital status, gender, race, income, employment status, education level, and gender specific parent age (see supplemental online material for full specification detail). Under the assumptions that the presence of children is random conditional on factors X, and a correctly specified functional form, γ captures the causal effect of children on well-being. We address violations of these assumptions and possible sources of bias in the discussion. A modified version of the model with an additional interaction term for gender x parenthood captures gender specific treatment effects.

Overall, we find that parents report higher average moods than non-parents conditioned on covariates but this effect is statistically insignificant (b = 0.03, p = 0.31). As depicted by Figure 1, this main estimate masks considerable heterogeneity in the influence of children by parent gender. We observe a significantly higher mood for women with children than those without (b = 0.09, p < 0.01), and a statistically insignificant lower average mood for men with children than for those without (b = -0.04, p = .28). This yields a large and statistically significant difference across parent gender (interaction: b = -0.13, p < 0.01). Our estimates imply that the positive association between children and motherhood is larger than the hedonic premium for marriage in our data (b = 0.06, p < 0.01). The effects also imply that a mother's least happiest weekday (typically Monday), all else equal, is as happy as a childless female's happiest weekday (typically Friday). The difference in the effect of parenthood on well-being for mothers and fathers also exceeds the difference in mood between a typical weekday and the weekend (i.e., when participants are happiest) (b = 0.11, p < 0.001). We note that this result is not highly sensitive to the inclusion of specific controls with the unconditioned regression of mood and parent gender yielding a similar pattern (women: b = -0.11, p < 0.01; men: b = 0.00, p = 0.99).

Figure 1.
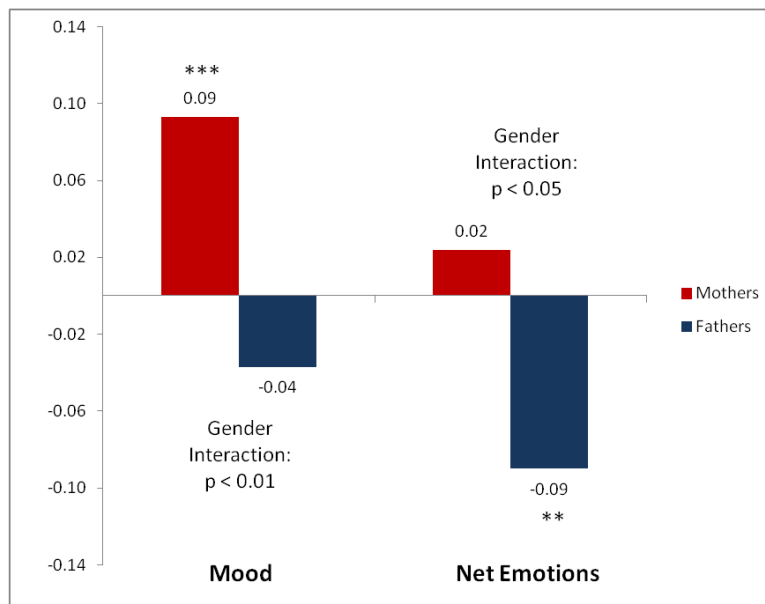**Parenthood and Well-Being by Gender**

Figure 1. Figure displays effects of parenthood on mood and net emotion of mothers and fathers as estimated from the baseline regression.

Net Emotion and Parenthood

We next assess the consequences of parenthood for emotion. Emotions represent a critical dimension of well-being, and may play a functional role in parent-child relationships. Positive emotion has been cited as leading to high life satisfaction, physical and social health, and longevity (16). With specific respect to parenthood, developmental psychologists have argued for the importance of emotions in parent-child attachment (17).

We first examine the emotional consequences of parenthood by constructing an index of net emotion by subtracting the number of negative emotions (anger, boredom, exhaustion, frustration, loneliness, overwhelmedness, sadness, worry) from the number of positive emotions (excitement, happiness, love, hope, relief, contentedness, confidence, interest) reported in each period of our data.[4]

As with mood, we find no overall effect of parenthood on the net emotions index (b = -0.03, p = 0.24). However, as Figure 1 shows, we again observe a large difference in response across parent gender (b = -0.11, p < .05). This gender difference is largely driven by a negative association between fatherhood and net emotion (b = -0.09, p < .05). The magnitude of the gender difference exceeds the positive effect of marriage on net emotions in our data (b = 0.06, p < 0.05). Separate analyses of positive and negative emotions reveal that, relative to motherhood, fatherhood results in more negative emotion (interaction: b = +0.03, p < .04), and less positive emotion though the latter result is not significant (interaction: b = -0.02, p = .18).

Overall the analysis of mood and emotions suggest that the effect of children on parental well-being differs significantly for fathers and mothers. Mothers, relative to their single counterparts, are associated with substantially higher mood and modestly more positive net emotions. Fathers are associated with a modestly lower mood and substantially less positive net emotion. We turn to data on time-use for insights into the mechanisms that may underlie these effects.

Time-Use and Parenthood
Why might children impair the well-being of men, but not of women? In consideration of the importance of time-use for overall experienced utility (18), we assess whether patterns in time-allocation can explain the association between mood and parenthood. We first construct six categories of time-use from available social and activity data—time with one's partner, time with children, time specifically engaged in activities with children, time spent alone, time doing work, and time with family and friends—designed to span a large fraction of how people spent their waking day. We include two categories for time-spent with children since the data permits this distinction and each is an independently important determinant of overall mood. While neither exhaustive nor mutually exclusive, participants report at least one of the time-use categories in 97.1% of half-hour periods in the study.

Figure 2 reports the raw time allocation across parents and non-parents by gender (note that due to the absence of mutual exclusivity, time-use shares sum to over 1). Overall, the figure suggests approximately similar patterns of time-use for male and female non-parents, but sharply different patterns for male and female parents. Compared to their childless counterparts, fathers exhibit a smaller increase in time spent with children than do mothers (difference for men: +0.38, p < 0.01; difference for women: +0.54, p < 0.01), a larger decrease in time spent with family and friends (difference for men: -0.07, p < 0.01; difference for women: -0.03, p < 0.01), a more modest decrease in time spent alone (difference for men: -0.13, p < 0.01; difference for women: -0.17, p < 0.01) and a larger increase in time spent working (difference for men: +0.06, p < 0.01; difference for women: -0.02, p < 0.01).

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[4] We do not code the one remaining emotion in our data, "indifference", as positive or negative.

Figure 2.
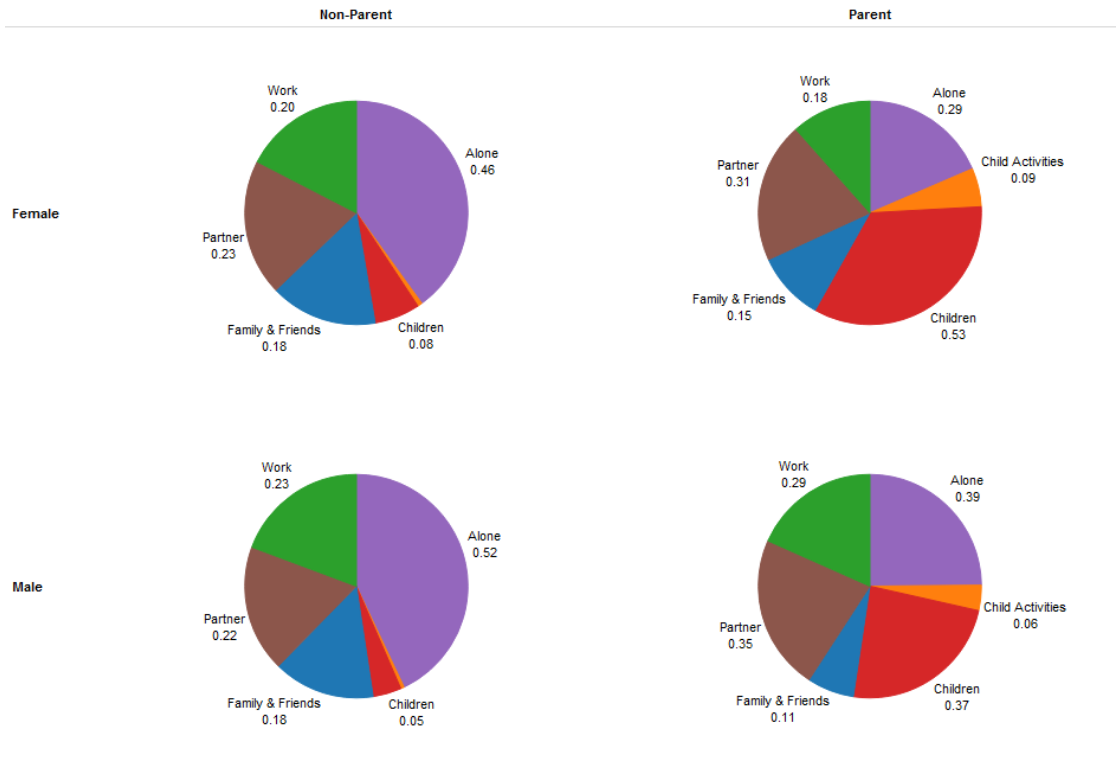**Time-Use and Parenthood by Gender**

Figure 2. Figure displays differences in reported time-allocation across parents and non-parents for males and females.

To fully understand how these differences in time-use translate into overall differences in mood, we estimate the hedonic returns to various activities by leveraging individual micro-data at the half-hour level. Estimates of these returns ultimately permit us to segment observed differences across fatherhood and motherhood into changes in time-use, holding fixed hedonic returns, and a residual component which we can attribute to gender differences in returns to each category of time-use (as well as differences in overall propensity towards well-being regardless of category). Specifically, we estimate the following regression separately for male and female parents:

$$mood_{it} = \alpha + \sum_j \gamma^j \; time_{it}^j + \pi_i + \varepsilon_{it}$$

where $mood_{it}$ indicates the mood reported in half-hour t for participant i. Categories of time-use are represented by $time_{it}^j$. We include individual fixed effects, π_i, to generate within-participant estimates.[5] Robust standard errors are clustered at the participant level to control for non-independence. Figure 3 reports the predicted mood associated with each time-use category by gender resulting from the

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[5] One might reasonably advise the inclusion of flexible controls to account for hour of day, day of week, month, and year variation. The inclusion of these period fixed effects do not change the observed pattern of results so we exclude them for simplicity.

regressions (calculated for category j as $\widehat{mood_j} = \hat{\alpha} + \hat{\gamma}^j$ where for interpretive ease, the estimator is parameterized under the constraint $E(\pi_i)=0$).

Figure 3.
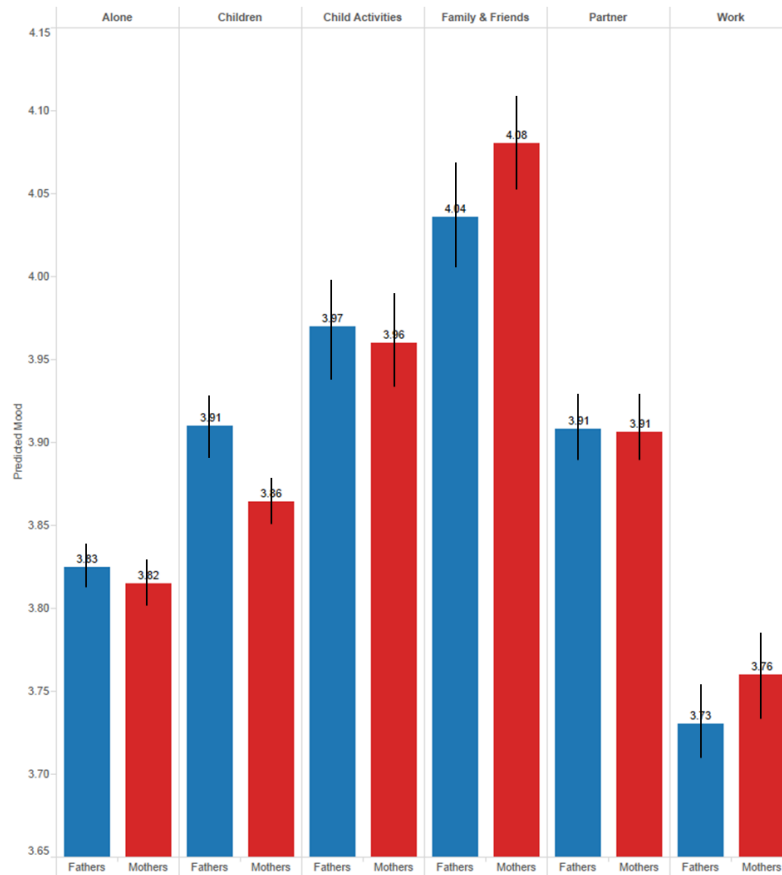**Predicted Mood across Time-Use Category by Parent Gender**

Figure 3. Figure displays predicted mood for each time-use category as estimated for mothers and fathers from regression described in text. Bars reflect prediction intervals.

The figure broadly indicates that across parent gender, time with family and friends, one's partner, and children yield the highest well-being, whereas time alone and at work are associated with the lowest levels of well being. When interpreted in light of time-use plots, the figure implies that in comparing fathers and non-fathers, the hedonic benefits of more time with children and less time alone may be offset by more time at work and less time with family and friends. It is notable that, while the overall mood of fathers may be lower than childless counterparts, this difference does not appear due to an aversion to time spent with children. A father's predicted mood when with children (overall: 3.91, activities: 3.97) exceeds the average mood of non-parent males (3.90), and fathers appear to enjoy time spent with children even more than do women (overall: $b = 0.05$, $p < 0.01$; activities: $b = 0.015$, $p = .38$). Women's positive return to parenthood appears driven at least in part by the fact that the positive benefits of time with children and less time alone are less likely to be offset by changes in other time-use categories.

To more explicitly account for how differences in time-use contribute to the overall change in mood due to parenthood, we perform a series of descriptive counterfactual analyses. We first ask what the predicted increase in mood would be for a typical father who exchanges his time-allocation for that of a typical mother holding hedonic returns constant. We construct this counterfactual by adapting a method popularized by economists to study wage and achievement differentials between groups (e.g., 19). Assuming an additive linear model of mood and time-use, we can calculate:

$E\left(mood^{father}|x^{mother}, \delta^{father}\right) - E\left(mood^{father}|x^{father}, \delta^{father}\right) = \delta^{father}\Delta x$, where x represents a vector of average time-use endowments and where δ^{father} reflects the reference vector of hedonic time-use coefficients estimated above for fathers.

The statistical exercise suggests that a hypothetical gender swap in time-use would predict an increase in the mood of fathers, who adopt the time-use of mothers, by .036. This equates to 41% of the estimated b = 0.09 coefficient of motherhood, 30% of the estimated b = 0.12 gender difference in the effect of parenthood across mothers and fathers, and is about equivalent to the estimated difference in well-being between fathers and childless males. Figure 4 depicts the results of this counterfactual alongside the total gender gap. 46% of this predicted shift in mood is attributable to less time at work, 20% to more time with children, 21% to more time with friends and family, and 15% to less time alone. In short, the gender difference in time-use accounts for a significant share of the overall gender differences observed.

The analogous counterfactual exercise with respect to net emotions predicts that fathers, holding returns constant, would benefit from a .038 increase in the net emotions index. This equates to 35% of the estimated b = -0.09 coefficient of parenthood for men, and 42% of the estimated b = 0.11 gender difference. Of this predicted change, 35% is due to more time with children, 34% is due to more time with friends and family, 19% is due to less time alone, and 11% time is due to less time at work.
A related question is how much of the estimated increase in mood associated with motherhood is attributable to observed differences in time-use. Similar to the calculation above, we can estimate the share of the mean difference in mood, conditioned on demographics, between mothers and non-parent females that can explained by time-use using the hedonic returns of non-parents as a reference group. In other words, we calculate the predicted change in mood for the typical non-parent female who adopts the time-use pattern of a typical mother: $E\left(mood^{npf}|x^{mother}, \delta^{npf}\right) - E\left(mood^{npf}|x^{npf}, \delta^{npf}\right)$. The exercise suggests that the differences in time-use across parenthood status accounts for 30% of the overall difference in mood for female parents and non-parents. A complication with this accounting is that the estimated hedonic returns to time with children may not be a reliable reference for non-parents who spend nominal time with children who are, by definition, not their own. If we instead use the hedonic returns to children of mothers as a reference, the accounting attributes 52% of the overall change in mood to time reallocation. We can then attribute the residual mood gap between mothers and non-parent females to differences in hedonic returns to time-use categories (i.e., coefficients), to differences in unobserved components of time-use, or to interactions between changes in hedonic returns to time-use and changes in time-use.

Figure 4.
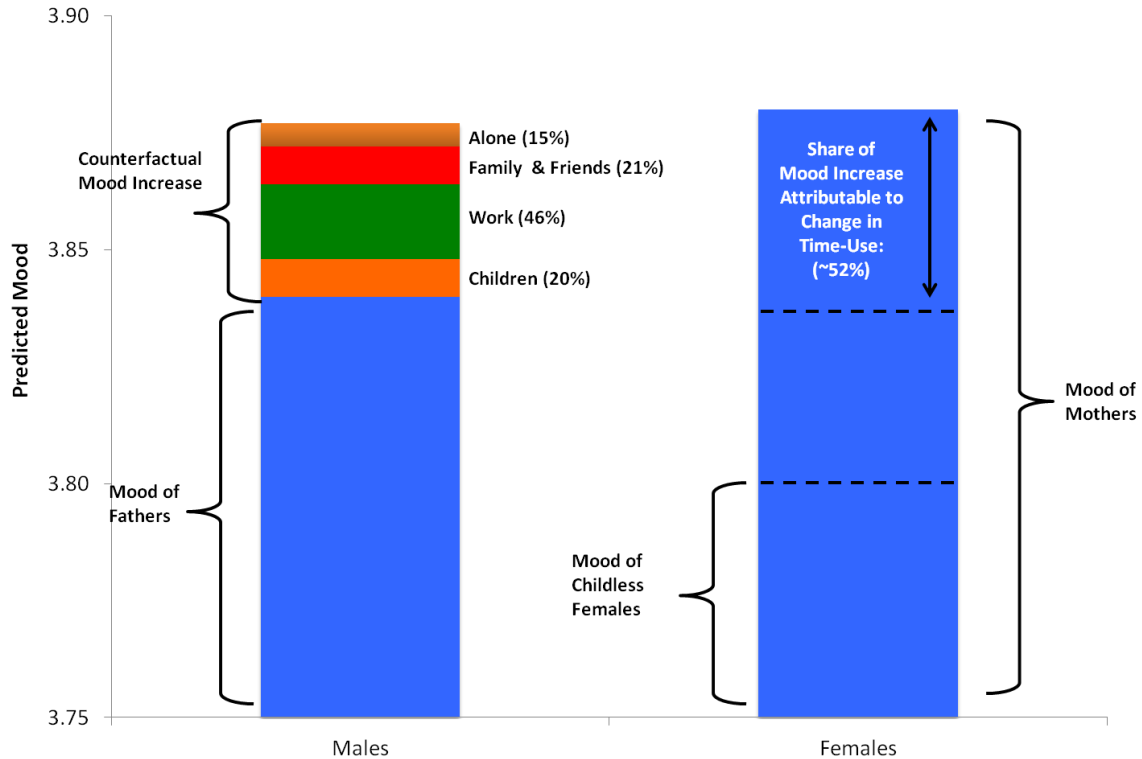**Counterfactual Analysis of Time-Use, Parenthood and Mood**

Figure 4. Figure displays the predicted change in the gender mood gap from the
counterfactual in which fathers adopt time-use of mothers.

Specific Emotions and Parenthood

While earlier we documented the link between net emotion and parenthood, a distinguishing characteristic of our data is that it features a large set of discrete emotions.[6] Representing emotions as a single mood or net emotion variable, while informative, hides potentially interesting differences between emotions such as anger and sadness that can have similar valence but be experienced as subjectively very different. We presently document the effects of parenthood on 17 discrete emotions for which we have data.

For each specific emotion we estimate a regression of the following form separately for men and women:

$$\overline{Emotion}^j{}_i = \alpha + \theta^j Parenthood^j_i + X\sigma + \varepsilon_i$$

where $\overline{Emotion}^j{}_i$ refers to the average likelihood of reporting emotion j for person i, and X, as above, represents a vector of demographic covariates. θ captures the partial correlation of parenthood and a specific emotion. Figure 5 reports the results of this analysis by parent gender. The significance of each gender difference is calculated using separate pooled regressions with an added gender interaction included as a covariate.

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[6] Emotion researchers debate the existence and discreteness of such emotion terms, as well as people's abilities to report discrete emotions (see (20) and (21) for review). We present analyses self-reports of a series of discrete emotions but make no claims regarding the independence of these emotions.

The figure communicates several patterns of interest. First, the analysis of happiness reassuringly corroborates earlier results regarding mood (women: $b = 0.04$, $p < 0.05$; interaction: $b = 0.04$, $p < 0.10$). To benchmark the size of the effect, the magnitude of the difference in reported happiness for women is once again larger than the estimated impact of marriage in the same data ($b = 0.025$, $p < 0.05$). Second, the plot yields an additional set of theoretically consistent results for the emotions of love, sadness, and worry. Mothers, but not fathers, report significantly more love than childless counterparts ($b = 0.02$, $p < 0.01$) – a magnitude equivalent to 50% of the average reported love across all females. Sizable gender differences in parenthood are also estimated for sadness (interaction: $b = 0.003$, $p < 0.05$, average sadness: 0.012) and reported worry (interaction: $b = 0.01$, $p < 0.05$, average worry: 0.02).

A third pattern is that fathers, relative to non-parent males, report heightened exhaustion ($b = 0.02$, $p < 0.01$) and the related state of overwhelmedness ($b = 0.005$, $p < 0.05$). This hints at some of the possible stresses associated with fatherhood. Finally, while a handful of emotions yield no significant patterns, analysis of hope and contentedness offer unexpected results. Mothers and fathers report less contentedness than non-parents (women: $b = -0.04$, $p < 0.05$; men: $b = -0.03$, $p < 0.10$), and mothers further report less hope than their counterparts ($b = -0.01$, $p < 0.05$).

We caution that while the 34 gender specific coefficients presented in Figure 5 reflect pre-planned comparisons, the large number of statistical tests implies a potentially high rate of Type I error. As an illustration, under the extreme assumption of hypotheses independence, sample variation alone should, under the null, produce 1 to 2 significant coefficients at $p < 0.05$. That we find 11 coefficients significant at $p < 0.05$, and a set of results that is approximately consistent with earlier analysis, speaks against the spuriousness of the patterns but interpretation of individual estimates warrants caution. An additional caveat merits mention. Researchers differ sometimes widely in the taxonomies used to classify emotions and even in the belief of the legitimacy of distinguishing across discrete emotions (20, 21). We avoid definitional controversy by simply reporting the entire set of emotion variables for which we have data.

Figure 5.
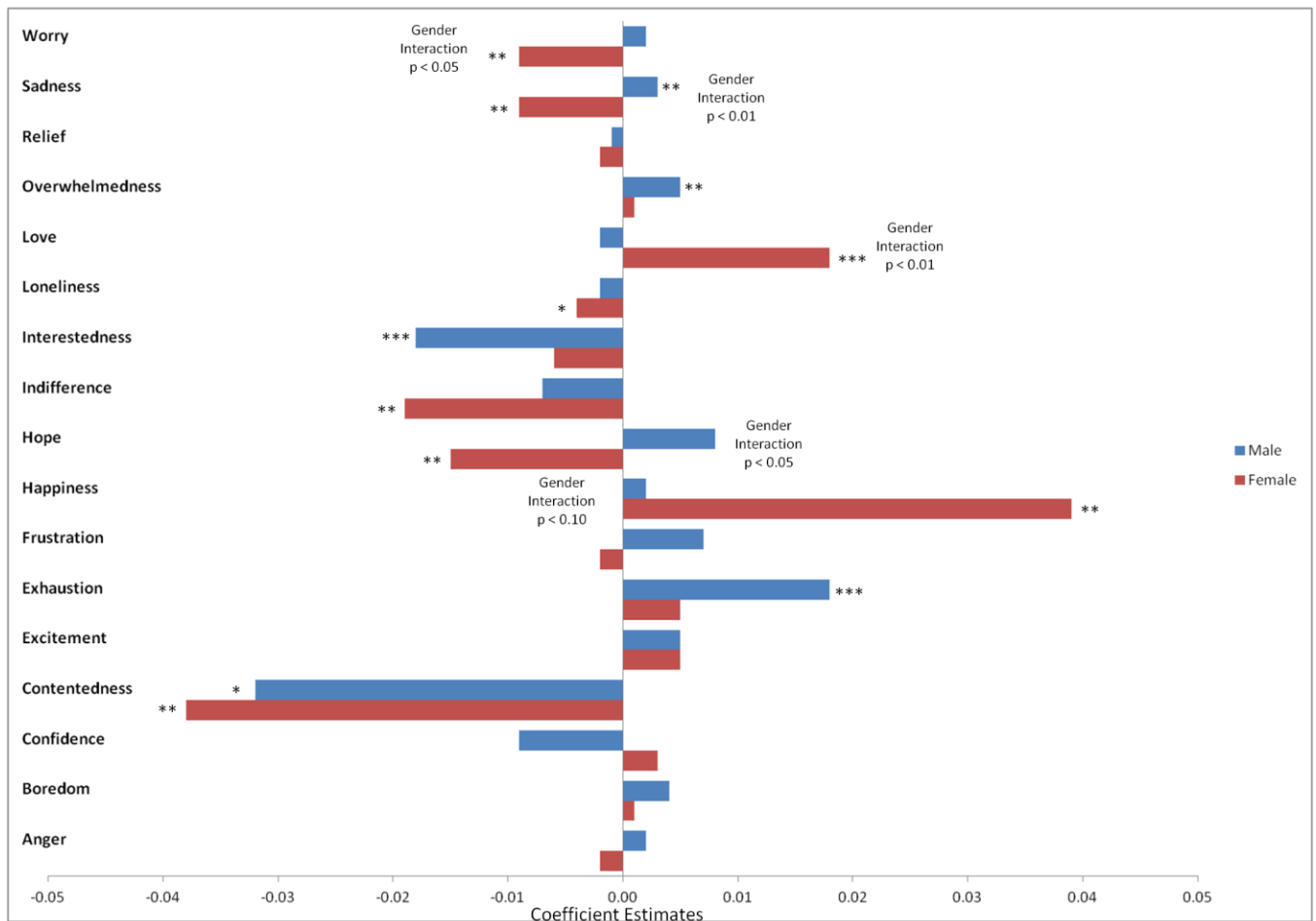**Specific Emotions and Parenthood by Gender**

Figure 5. Figure displays the association between motherhood and fatherhood for each of 17 discrete emotions.
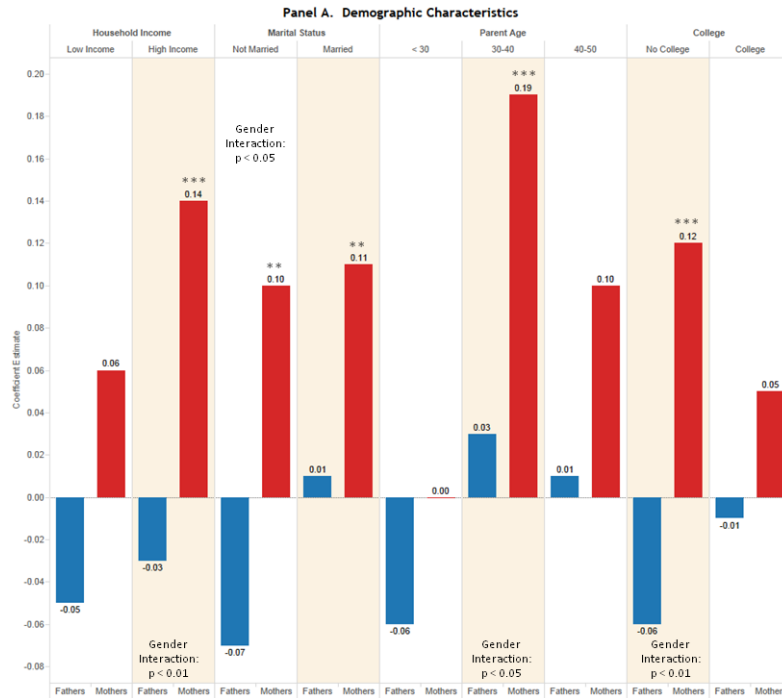
Heterogeneity in Treatment Effects

We have thus far reported average hedonic consequences across the highly varied circumstances and demographics that characterize parenthood. In recognition of the likely heterogeneity in the effect of children on parents, Figure 6 depicts results of the baseline analysis estimated separately across a series of demographic (parental age, household income, college attendance, and marital status) and child (number of children, child age, and gender of the eldest child) characteristics. The figure displays the main effect of parenthood for mothers and fathers, as well as the significance of the gender interaction.

While subject to imprecision due to diminished samples, the analysis suggests that the positive effect of parenthood for mothers and the parental gender difference is fairly robust across parental circumstances. Nevertheless, across demographic variables, the figure indicates that the positive impact of children on well-being for mothers is particularly pronounced for those with higher than median household income (b = 0.14, p < 0.01) and those between 30 and 40 years (b = 0.19, p < 0.01), and is weaker for those with lower income (b = 0.06, p = 0.23), younger mothers under the age of 30 years (b = 0.00, p= 0.99), and

intriguingly, those with a college degree (b = 0.05, p = 0.46). The link between fatherhood and well-being is particularly negative for men with below median income (b = -0.05, p = 0.40), the unmarried (b = -0.07, p = 0.26), fathers under 30 years (b = -0.06, p = 0.50), and those without college degrees (b = -0.06, p = 0.17). These patterns are consistent with the notion that parenthood is most gratifying in the abundance of economic and social resources.

Across child characteristics, two patterns emerge. First, fathers and mothers report higher relative hedonic returns to parenthood in the presence of younger children (fathers: b = -0.01, p = 0.86; mothers: b = 0.18, p < 0.01). The implied preference for younger children is consistent with prior work (1). Second, the estimated return to parenthood is twice as high for mothers with a single child (b = 0.14, p < 0.01) as it is for mothers with multiple children (b = 0.07, p < 0.10). For mothers, the higher return for younger children and the pattern across number of children is consistent with the possibility of hedonic adaptation.

Figure 6.
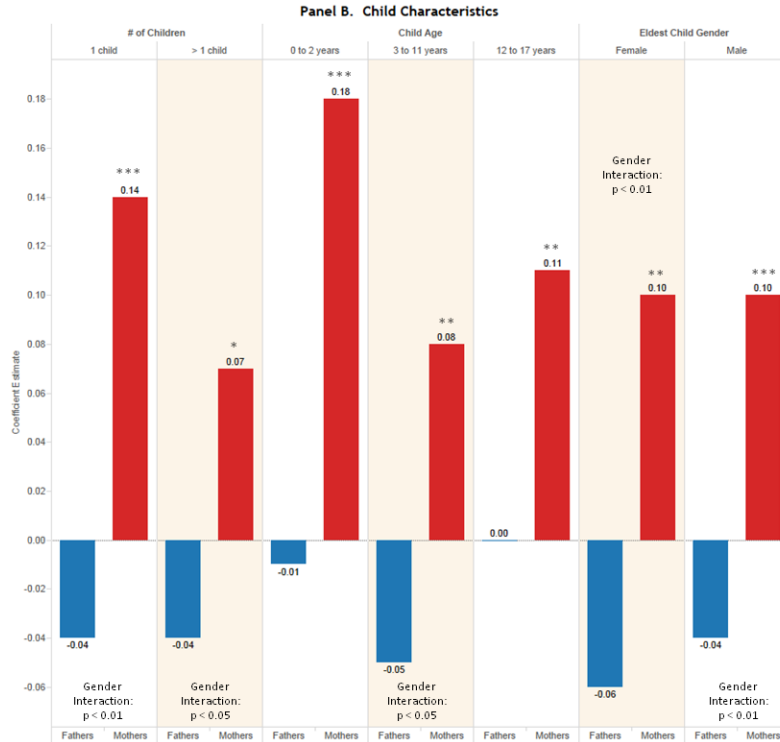**Analysis of Parenthood Heterogeneity by Demographic and Child Characteristics**

Figure 6. Figure displays heterogeneity in the effect of parenthood on mood by parent gender for demographic and child characteristics of interest.

DISCUSSION

Limitations and Selection

We establish a link between well-being and parenthood that is moderated by parent gender. To the extent that causality in this context is conceptually meaningful (14), our analysis should only be interpreted as causal, if, among other assumptions, well-being is independent of parenthood conditioned on observed covariates (i.e., if $E(e|X) = 0$). In other words, if parenthood is as good as randomly assigned conditioned on observable characteristics, then cross-sectional comparisons may reveal the causal effects of parenthood. On the other hand, if, for example, mothers with household help are more likely to become parents, and such household help is linked to happiness, then parenthood may not be causally linked to higher well-being despite our finding. An alternative potential concern is controlling for *too many* covariates that may themselves be causally determined by parental status (e.g., 1, 14). While this poses a potential challenge, our main findings are strikingly robust to specification and are virtually unchanged in even bivariate estimates. Finally, even assuming internal validity, the external validity of our study rests on the representativeness of the sample. If participation in the study is tied to factors linked to well-being, parenthood, and gender, then the results may not generalize (e.g., Heffetz and Rabin point to a potential form of selection bias in phone surveys of well-being that may be linked to parenthood, 22).

Noting that the presence of any bias would likely have to be specific to mothers, and not fathers, to account for the gender-linked patterns we document, how reasonable are such assumptions? As one strategy to assess the possible role of selection bias in our design, we plot the treatment effect (i.e., the change in mood due to parenthood) as a function of a propensity score for the likelihood of having children that we estimate from the hundreds of additional individual-level characteristics available in our data. Propensity score matching is a popular strategy for reducing the dimensionality of a rich set of potential controls to better understand causal treatment effects where selection into treatment might be viewed as problematic.

We estimate a propensity score with a logit regression of parenthood (again excluding grandparents) on a linear additive function of several hundred (typically dichotomous) variables describing demographic and life-style characteristics (pseudo $R^2 = .56$). We restrict the variables to those not likely to be affected by treatment and might plausibly influence both the likelihood of having children and mood. The variables include extremely detailed data on income, occupational choice, geography, education, cultural background, wealth, cell phone adoption, etc. Figure 7 plots the treatment effect separately for men and women. That is, the figure plots the average mood for parents and non-parents by the estimated propensity scores (using bins of .15). We exclude the two end-points for which minimal common support exists. We can interpret the depicted difference between parents and non-parent mood as causal if well-being is independent of parenthood conditional on the estimated propensity of having a child.

Looking first at females, the figure implies a positive average treatment effect of parenthood across each propensity score bin. This constant positive effect is consistent with the absence of unobserved confounds in the original estimate of parenthood in the baseline regression. The figure implies an overall average treatment effect of 0.16 which is larger than the 0.08 estimated from the baseline regression (including the excluded endpoints implies an even larger treatment effect). The plot does leave open the possibility of heterogeneity in the parenthood effect with larger effects for females with high and low predicted likelihoods of having children.

Figure 7.
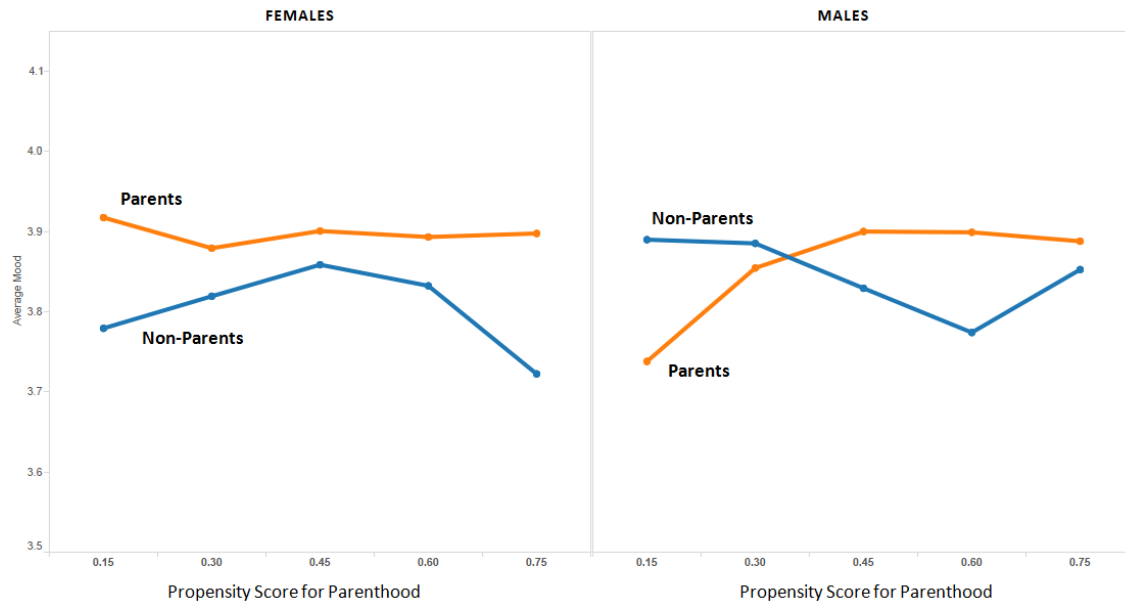**Treatment Effect by Propensity Score and Parent Gender**

Figure 7. Figure plots the treatment effect by propensity for parenthood and parent gender over range for which sufficient support exists.

The analogous exercise for males also corroborates the findings of the baseline regression. The average treatment effect across propensity scores of -0.06 is similar to the overall estimate for parenthood of -0.04 from the baseline estimate. Intriguingly, the plot again implies potential effect heterogeneity with particularly negative effects for men predicted to not have children (e.g., those typically of lower age). Overall, the treatment effect recovered from the propensity score analysis directionally confirms the results of the prior analysis. To the extent that treatment effect heterogeneity exists, mothers with the highest predicted likelihood of having children experience the largest benefit from parenthood, while fathers not highly predicted to have children experience the largest decrement in mood. This is consistent with the possibility that those adults standing to benefit from parenthood are more likely to sort into having children (14).

Hedonic Forecasts and Focusing Illusion
Our results point to a possible explanation for the widespread belief across genders that children deliver happiness (3). If beliefs regarding the hedonic influence of an event are shaped by the recall of salient, or prototypical, episodes involving the event due to a "focusing illusion" (15), men, despite no increase in aggregate mood, may believe in positive hedonic returns to children. If, as our data suggest, direct time spent with children is associated with higher well-being than time without children (mean with children: 3.95, and without: 3.80), then men may narrowly judge the value of children from such episodes with children while neglecting the effect of children on residual time allocation.

Long-run Effects of Parenthood and Grandparenthood
One drawback of our design, and other studies of parenthood, is that we define children as those under 18 living in an adult's home. Some researchers have asserted that the benefits of parenthood may accrue

when elderly parents benefit from the presence (or economic largesse) of older children and grandchildren. Our data permits an approximate test of the long-run impact of parenthood. By leveraging the available data on the grandparenthood status of participants, we can compare the well-being of grandparents in the sample to participants who are neither grandparents nor "parents" (i.e., people who do not have a child under 18 in the household). This comparison jointly captures the hedonic consequences of grandparenthood and of having adult children. We note that this comparison is imperfect in that the control group comprises both non-parents and parents of adult children but without grandchildren. We adapt the baseline regression above and again use flexible controls for gender x age to ensure that comparisons occur across equal age bins across groups.

While we interpret our results with caution, they nevertheless indicate long-run effects of parenthood and grandparenthood that are similar to those estimated for parents, excepting slightly happier grandfathers. Overall, the effect of grandparenthood on well-being is actually positive (b = .08, p < .05). The results reflect a marginally significant gender gap as grandmothers are associated with a large and significant increase in mood compared to non-grandparent females (b = .13, p < .01), while grandfathers are associated with a smaller and insignificant increase compared to non-grandparent males (b = .03, p = .57; interaction b = -.10, p < .10). Intriguingly, much like the broader sample, grandfathers spend significantly less time with children (i.e., grandchildren and possibly adult children) (0.09), than do grandmothers (0.13).

CONCLUSION

Our study offers new evidence as to the hedonic and time-use consequences of parenthood using novel in-the-moment data on mood and emotion. Establishing the link between children and well-being and understanding the complicated role of situational factors in moderating and mediating this relationship, carries implications for evolutionary motives of child-birth, economic models of parent investment, and for prospective parents aspiring to make an informed choice in an important life domain. Further work needs to be done to understand whether the proposed explanation of a focusing error may reconcile our findings with the rich prior literature on prospective and retrospective accounts of parenthood.

REFERENCES

1. Herbst C & Ifcher J (2012) A bundle of joy: Does parenting really make us miserable? *Available at SSRN 1883839.*

2. Stanca, L (2012) Suffer the little children: measuring the effects of parenthood on well-being worldwide. *Journal of Economic Behavior and* organization 81: 742-50.

3. Hansen T (2012) Parenthood and happiness: A review of folk theories versus empirical evidence. *Soc Indicators Res* 108(1): 29-64.

4. Redelmeier DA & Kahneman D (1996) Patients' memories of painful medical treatments: Real-time and retrospective evaluations of two minimally invasive procedures. *Pain* 66(1): 3-8.

5. Schreiber CA & Kahneman D (2000) Determinants of the remembered utility of aversive sounds. *J Exp Psychol : Gen* 129(1): 27.

6. Smith DM, Schwarz N, Roberts TR & Ubel PA (2006) Why are you calling me? how study introductions change response patterns. *Quality of Life Research* 15(4): 621-630.

7. Schwarz N (1999) Self-reports: How the questions shape the answers. *Am Psychol* 54(2): 93.

8. Furnham A & Cheng H (2000) Lay theories of happiness. *Journal of Happiness Studies* 1(2): 227-246.

9. Kahneman D (2000) *Experienced Utility and Objective Happiness: A Moment-Based Approach,* pp 673-692.

10. Steptoe A, Wardle J & Marmot M (2005) Positive affect and health-related neuroendocrine, cardiovascular, and inflammatory processes. *Proc Natl Acad Sci U S A* 102(18): 6508-6512.

11. Riis J*, et al* (2005) Ignorance of hedonic adaptation to hemodialysis: A study using ecological momentary assessment. *J Exp Psychol : Gen* 134(1): 3.

12. Scollon CN, Kim-Prieto C & Diener E (2003) Experience sampling: Promises and pitfalls, strengths and weaknesses. *Journal of Happiness Studies* 4(1): 5-34.

13. Nelson, K, Kushlev K, English T, Dunn EW, & Lyubomirsky, S (2013) In defense of parenthood: Children are associated with more joy than misery. *Psychological Science* 24: 3-10.

14. Deaton, A & Stone AA (forthcoming) Evaluative and hedonic wellbeing among those with and without children at home. *Proceedings of the National Academy of Sciences.*

15. Wilson TD, Wheatley T, Meyers JM, Gilbert DT & Axsom D (2000) Focalism: A source of durability bias in affective forecasting. *J Pers Soc Psychol* 78(5): 821.

16. Keltner D & Lerner JS (2010) Emotion. *Handbook of Social Psychology*

17. Barrett KC & Campos JJ (1987) Perspectives on emotional development II: A functionalist approach to emotions.

18. Kahneman D, Krueger AB, Schkade DA, Schwarz N & Stone AA (2004) A survey method for characterizing daily life experience: The day reconstruction method. *Science* 306(5702): 1776-1780.

19. Oaxaca R (1973) Male-female wage differentials in urban labor markets. *International Economic Review* 14(3): 693-709.

20. Barrett, LF (2006) Emotions as natural kinds? *Perspectives on Psychological Science* 1(1): 28-58.

21. Barrett, LF, Mesquita B, Ochsner KN, & Gross JJ (2007) The experience of emotion. *Annual Review of Psychology*.

22. Heffetz O & Rabin M (2013) Conclusions regarding cross-group differences in happiness depend on difficulty of reaching respondents. *American Economic Review* 103(7): 3001-3021.