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BRIEF REPORT

Parents' work arrangements and gendered time use during the COVID-19 pandemic

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Abstract

Objective: This study uses time diaries to examine how parents' work arrangements shaped their time use at home and work during the COVID-19 pandemic.

Background: The pandemic transformed home and work life for parents, disrupting employment and childcare. The shift to work from home offered more flexibility to manage increased care burdens, but the lack of separation between work and family also likely contributed to more challenging work environments, especially among mothers.

Method: This study relies on the 2017–2020 American Time Use Survey and matching to estimate changes in time use among parents working from home and on site in the pandemic relative to comparable parents prior to the pandemic.

Results: Data showed no overall increases in primary childcare time among working parents. Parents working from home during the pandemic, however, spent more time in the presence of children and supervising children, much in combination with paid work. Mothers working from home increased their supervisory parenting while working for pay more than fathers, and they more often changed their paid work schedules. The study's main findings were robust to gendered unemployment and labor force exits.

Conclusion: Parents, especially mothers, working from home responded to childcare demands through multitasking and schedule changes with potential negative effects on work quality and stress. Parents working on site during the pandemic experienced smaller changes in time use.

Implications: The pandemic has generated new inequalities between those with and without the flexibility to work from home, and exacerbated gender inequalities among those working from home.

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KEYWORDS

gender, housework, parenting, time use, work, work-family issues

INTRODUCTION

The COVID-19 pandemic reshaped links between work, family, and time use for many parents, disrupting employment and parenting, and moving much of the workforce into work from home. Among all employed men and women, the percentage working at home rose from 22% overall in 2019 to 42% in 2020, and to nearly a half among women (U.S Bureau of Labor Statistics, 2020). Perspectives on time use offer competing predictions for how these changes played into mothers' and fathers' paid and unpaid work. The time availability perspective suggests that the shift to work from home should afford both mothers and fathers more time and flexibility to manage increased childcare and housework demands (Bianchi et al., 2000; Davis et al., 2007). The gender perspective, by contrast, emphasizes gendered expectations of care and highlights the potential for blurred boundaries between work and family to negatively affect work environments, particularly for mothers, and to exacerbate gender inequalities at home and work (Blair-Loy, 2009). Findings on telecommuting and gendered time use prior to the pandemic are mixed, showing fathers picked up more slack in childcare on work-at-home days but less in housework, and mothers' paid work from home was more often interrupted by childcare (Lyttelton et al., 2022).

How parents use their time has implications for labor market outcomes and economic well-being (Stewart & Stewart, 1999), health and subjective well-being (Musick et al., 2016), and within-family economic equality (Musick et al., 2020). As telecommuting becomes increasingly widespread, it is critical to understand how it has affected parents' time use and what implications it might have in a post-pandemic world. This study examines how work arrangements shaped mothers' and fathers' time use at home and work from May to December 2020. It relies on nationally representative data from the 2017–2020 American Time Use Survey (<https://www.bls.gov/tus/>) to estimate changes in paid work, childcare, and housework among parents working from home and on site in the pandemic relative to pre-pandemic comparison groups.

Our approach advances our understanding of pandemic work arrangements and parents' time use in two ways: (1) We use several matching strategies (Iacus et al., 2012) to identify pre-pandemic comparison groups with comparable characteristics to parents who either transitioned to work from home or remained working on site during the pandemic, allowing us to estimate changes in time use by parents' work arrangement. (2) We leverage information about activity type, the presence of children, and time of day to differentiate between hands-on and supervisory childcare and to assess changes in the context and scheduling of work. Our findings contribute to growing evidence that the pandemic has created new inequalities both across work arrangements and between mothers and fathers.

BACKGROUND

Competing perspectives offer different accounts of how work arrangements should structure parents' time at home and work by gender. The time availability perspective is gender neutral in its predictions (Bianchi et al., 2000; Davis et al., 2007). Applied to working from home, any time saved from commuting and associated activities becomes available for unpaid work. Working from home may also afford greater flexibility to manage childcare demands, for example, the ability to monitor remote learning during paid work hours. The greater time availability and flexibility to attend to family demands should level gender differences in paid and unpaid work. The gender perspective, by contrast, emphasizes the gendered norms of male breadwinning and female

caregiving (Blair-Loy, 2009; Townsend, 2002), gendered power relations in negotiations over household tasks (Bianchi et al., 2000; Davis et al., 2007), and the greater responsiveness of mothers to caregiving needs (Bianchi et al., 2000; Musick & Jeong, 2021). Applied to working from home, gendered expectations should leave mothers more vulnerable to work disruptions and multitasking while working at home, and widen gender gaps in paid and unpaid work (Lyttelton et al., 2022; Offer & Schneider, 2011; Yavorsky et al., 2021).

Research on work arrangements and parents' time use prior to the pandemic is relatively sparse and rarely accounts for selection into telecommuting. Earlier studies have shown that remote work tends to increase men's and women's paid work hours (Chung & Van der Horst, 2018; Glass & Noonan, 2016), but findings on unpaid work have been mixed. Noonan et al. (2007) and Silver (1993) found that fathers working from home spent about the same amount of time in unpaid work relative to fathers working on site. Carlson et al. (2021), by contrast, reported that fathers did more childcare and housework when they worked from home, although housework results held only when their partners worked full time. Using a quasi-experimental design, Lyttelton et al. (2022) also found that remote work reduced the gendered division of childcare, but *increased* gender disparities in housework. They furthermore showed that telecommuting mothers experienced more childcare-related work disruptions than telecommuting fathers, consistent with gendered parenting norms and the tendency for mothers to be the family's default caretaker (Blair-Loy, 2009; Calarco et al., 2021; Lyttelton et al., 2022).

The pandemic drastically changed the work family landscape. Alongside the shift to remote work, the scale of job losses and job leaving in the early months of the pandemic was unprecedented, particularly among mothers and those whose jobs could not easily transition to remote work (Alon et al., 2020; Montenovio et al., 2022). School closings and disruptions to childcare increased parents' care demands; the 2020 wave of the ATUS showed that the total time parents spent on childcare combined with other activities increased by an average of over an hour per day per parent (American Time Use Survey, 2021 — *May to December 2019 and 2020 Results*). In the early months of the pandemic, mothers reduced their work hours more than fathers (Collins et al., 2020; Villarreal & Yu, 2022) but findings on gender gaps in parenting and housework have not been as consistent (Augustine & Prickett, 2022; Calarco et al., 2021; Carlson et al., 2020; Petts et al., 2021). This may be due in part to timing, as longitudinal research suggests that after an initial narrowing of gender gaps, couples' division of labor returned to a pre-pandemic status quo (Carlson & Petts, 2021). Across countries, studies have documented increases in gender gaps in childcare and housework in some national contexts (Costoya et al., 2022; Giurge et al., 2021), and decreases in others (Craig & Churchill, 2021; Del Boca et al., 2020).

A few studies have looked at the role of work arrangements in shaping parents' time use in the pandemic. Comparisons of parents working from home and on site suggest that remote work during the pandemic may have narrowed gender gaps in paid and unpaid work. Mothers working from home in the pandemic spent more time on paid work than mothers who worked on site (Alon et al., 2022), and fathers working from home spent more time in housework and childcare (Carlson & Petts, 2021; Dunatchik et al., 2021; Shafer et al., 2020). Among mothers and fathers working from home in the pandemic, however, gender gaps in time use appear to have increased compared to pre-pandemic. A survey administered in April 2020 found that when only the mother worked from home, mothers were more likely to take on a greater share of domestic work as opposed to when only the father worked from home (Dunatchik et al., 2021). Further, data from the February and April 2020 Current Population Survey (CPS) showed that gender gaps in paid work hours increased from pre- to post-pandemic in dual-telecommuting households, indicating that mothers in these families disproportionately took on the increased burden of household labor (Collins et al., 2020; Landivar et al., 2020).

Research to date on these questions has been limited in assessing detailed aspects of time use in the pandemic. Beyond childcare time, how mothers and fathers have adjusted their time in specific childcare activities may shed additional light on the links between work arrangements, parenting, and gender. Data have shown that mothers were spending more time than fathers helping children with remote learning (Augustine & Prickett, 2022)—would these gaps differ among mothers and fathers working from home or on site? Fathers typically spend a larger share of their time with children in more enjoyable activities like play and leisure, while mothers differentially take on basic tasks like feeding and bathing (Musick et al., 2016)—again, how would these differences play out by parents' work locations? As we noted above, it could be that working from home increases parents' availability to attend to increased demands on the home front and levels gender differences in domestic work, or gendered expectations of care may interact with the blurring of work-family boundaries to reify or exacerbate gender differences in not just the amount but also the nature of domestic work. We assess these propositions, comparing time use changes in the pandemic between remote and on-site workers and between mothers and fathers by their work arrangements. Supplementary analyses assess the robustness of our matching strategies and the sensitivity of our findings to gendered unemployment and labor force exits during the pandemic, which ultimately shape who we capture in our analysis of working parents.

Our study is the first to our knowledge to use U.S. time diary data to closely examine the association between parents' work arrangements and time use in the pandemic. We estimate time use prior to the pandemic and differences in time use between 2017–2018 and 2020. Our main analyses use matching to assess differences in: (1) broad categories of time use, including paid work, childcare, parent–child copresence, supervisory parenting, and housework; (2) detailed parenting activities, including routine, play, teaching, and management; and (3) paid work environments, including time when children are present, supervisory parenting while working, work spells, and work outside of 9:00 a.m.–17:00 p.m. weekday hours. Our matching approach extends the literature by accounting for variation in the characteristics of parents that potentially confound comparisons of time use, both across work arrangements and before versus during the pandemic. Most parents who have been able to work from home during the pandemic hold white collar jobs (Parker et al., 2021), whereas a large portion of in-person workers are lower paid, lower socioeconomic status, immigrants, and people of color (Lyttelton & Zang, 2022). Without accounting for these differences, variation in parents' time use across employment situations before the pandemic versus during the pandemic may largely capture selection effects. Our attention to more detailed aspects of time use compared to previous studies allows us to paint a more complete picture of how remote and on-site work experiences have shaped the nature of work and family life over the pandemic.

METHODS

American time use survey

We use data from the 2017 to 2020 American Time Use Survey (ATUS), which records the nature and context of daily activities for a representative sample of Americans (Hofferth et al., 2018). ATUS respondents are drawn from the CPS, which collects social and demographic characteristics. Approximately 2–5 months after exiting the CPS panel, a portion of respondents report all activities undertaken over 24 h from 4:00 a.m. on the day prior to interview. Respondents reported how long they spent on each activity, who else was present, and where it took place. We use this information to construct measures of time use.

ATUS paused data collection between March and May 2020. Therefore, we compare 2020 diaries from May to December to diaries collected in the same period in earlier waves (per

communication with ATUS survey scientists). Response rates do not seem to have changed in the pandemic, that is, they were similar in 2020 and 2021 (American Time Use Survey, 2021 — *May to December 2019 and 2020 Results*).

Our sample includes working parents aged 21–60 with at least one coresident child 18 or younger in the 2017, 2018, and 2020 waves of ATUS (the 2019 wave excludes information we use in our main analysis to generate pre-pandemic comparison groups). Because we are interested in time use on workdays, we exclude 2011 parents across all waves who worked less than 1 h on the diary day. The inclusion of parents working any amount does not substantively change our findings (results available upon request). Small samples preclude separate analyses of the unemployed, although supplementary analyses assess the sensitivity of our results to job leaving/loss during the pandemic.

Time use measures

We define *paid work time* to include time spent on paid work and all related travel. We include travel time here, and in the other time use measures, because doing so captures the time demands activities placed on parents and because workplace and school closures during the pandemic have particularly impacted time spent on travel. To further investigate the contribution of travel to time use changes, we conducted analyses excluding travel time from associated activities. The results are consistent.

We create three summary measures of parenting time. *Childcare* captures time spent on activities in which caring for children is the primary focus. It combines basic care activities of younger children (e.g., feeding, bathing) with activities relating to education (e.g., helping with a child's homework or attending a PTA meeting), play, health (e.g., sitting with a sick child), and associated travel. *Child copresence* is time in any activity in which parents report their own child are “in the room with or accompanying” them. *Supervisory parenting* relies on ATUS' coding of “secondary childcare” and sums time parents report children in their care during activities in which childcare is not the primary focus. Copresence and supervisory parenting are distinct and complementary measures that potentially capture different dimensions of gendered parenting. Children can be in the care of a parent without being in the same space, and conversely, a parent and child can be in the same space without the parent being primarily responsible for their care. Supervisory parenting thus specifically picks up on differences in parenting responsibilities and sheds light on who tended to serve as the default caregiver during the pandemic. One limitation of these measures is that ATUS directly measures “secondary” childcare for parents of children under age 13, but records copresence for all minor children. To test the sensitivity of our results to these different age ranges, we replicated our childcare analyses by only including children 12 or younger (Figure A1).

We define *housework* to include both core housework (e.g., cleaning, tidying, laundry, and cooking), ancillary housework (e.g., household and vehicle maintenance), and travel related to housework. Prior research reveals gender inequalities in both broadly and narrowly defined housework, but larger inequalities in the latter case (Bianchi et al., 2012). The findings suggest that our estimates may be conservative. Time use outcomes are top-coded at the 99th percentile to decrease the influence of extreme values.

We create detailed childcare measures to gain further insights into the ways in which parenting practices have changed during the pandemic. We follow prior studies (Kalil et al., 2012; Musick et al., 2016) and decompose childcare into four sets of related activities. *Routine* childcare includes direct physical care, looking after children, and caring for children. *Play* includes sports and non-sports playing and arts and crafts. *Teaching* includes activities related to a child's education, reading to or with a child, teaching or helping a child, and talking or

listening to a child. *Management* includes travel related to childcare, waiting with or for children, organizing and planning, attending children's events, and activities related to children's health.

Finally, we construct six measures that indicate competing work demands and divided attention. *Child copresence while working* and *supervisory parenting while working* restrict the broad copresence and supervisory parenting measures discussed above to only time when parents are doing paid work as their primary activity. *Work spells* is the number of separate work activities across diary days and captures the extent to which work is fragmented, which may indicate interruptions (Flood et al., 2020). We examine three dimensions of work schedules to assess the extent to which parenting responsibilities during the work (and school) day may lead parents to spread paid work over a longer period. *Early work* is time spent on paid work before standard hours (between 4:00 a.m. and 9:00 a.m.). *Late work* is time spent on paid work after standard hours (between 17:00 p.m. and 4:00 a.m.). *Weekend work* is time spent on paid work on a Saturday or Sunday.

Sociodemographic characteristics

Our descriptive analyses account for the employment, family, and demographic characteristics of our samples during and prior to the pandemic. *Weekly earnings* is average weekly earnings in 2020 dollars. *Work hours* is usual weekly paid work hours. Family characteristics include *number of children in the household*, *age of the youngest child* (0–5, 6–11, 12+), and if a respondent is *partnered*. Demographic measures include race-ethnicity (non-Hispanic White, non-Hispanic Black, and Hispanic) and college degree status.

Parents' work locations and matching strategies

Prior to the pandemic, relatively few parents worked remotely. The family situations of those that did remote work typically differed considerably from those that did not (Lyttelton et al., 2022). In contrast, remote work was common during the pandemic, and it was driven mostly by government or employer mandates, rather than the choices of individual parents. Therefore, directly comparing parents working from home and on site before and during the pandemic is not an apples-to-apples comparison. To assess change during the pandemic, we use matching strategies to identify pre-pandemic comparison groups; specifically, in our main analyses, we compare parents working from home and on site during the pandemic, respectively, to: (1) parents with jobs that allowed remote work prior to the pandemic, and (2) parents with jobs that did not allow remote work prior to the pandemic. We categorize working parents during the pandemic according to their work location during paid work on the diary day. Parents are *working from home* if they worked exclusively from home on the diary day, and parents are *working on site* if they worked exclusively on site. To simplify our comparisons, we drop a small number of parents working from both locations over the course of the day ($N = 286$); coding these cases as working on site does not change our results (available upon request).

To generate pre-pandemic comparison groups for the aforementioned two categories of parents, our main matching strategy relies on a question from the 2017–2018 ATUS leave module (not available in 2019), which asks respondents “as part of your (main) job, can you work at home?” We classify parents as working a job that can be worked remotely if they answered “yes,” and as working a job that must be worked on site if they answered “no.” The former is the comparison group for remote workers during the pandemic (the “home sample”) and the latter is the comparison group for in-person workers during the pandemic (the “on-site sample”). Among parents in our sample who reported that they could work from home, 25%

reported working a full day from home at least once a week, and 49% reported never working a full day from home at their current job, with the median parent working a full day from home less than once a month.

To verify the suitability of these comparisons, Table 1 presents paid work, family, and demographic characteristics for the “on-site sample” and the “home sample,” along with *t*-tests of differences across work locations and periods. We highlight two main take-aways from Table 1: First, it shows that we have fair comparisons within each of the two samples, that is, pre-pandemic parents are broadly similar to parents during the pandemic within each of the two samples, with *t* tests showing no significant differences. Second, it shows substantial differences across samples, as expected. For example, during the pandemic, mean earnings for parents working from home and on site were \$1521 and \$977 per week, respectively. Parents working from home were on their jobs, on average, 0.45 h per week more than parents on site. Parents working from home were also 11 percentage points more likely to be partnered, 2.1 years older, 42 percentage points more likely to be college-educated, 8 percentage points more likely to be women, 9 percentage points less likely to be Black, and 13 percentage points less likely to be Hispanic, relative to parents working on site.

Although descriptive statistics provide good evidence of the suitability of these comparison groups, there are a few potential weaknesses to the approach that might exclude pre-pandemic workers who transitioned to remote work in the pandemic. First, the infrequency of remote work prior to the pandemic suggests that workers and employers underestimated their capacity to work from home. Relatedly, there might be reporting biases in whether a worker’s job is telecommutable. Finally, it is possible that we missed some jobs that were not telecommutable before 2019 and became telecommutable in 2019, when the ATUS did not field the telecommuting questions. To address potential concerns with our main matching strategy, we test the sensitivity of our results based on two alternative strategies for identifying parents in telecommutable jobs: (1) we identify occupations in which more than 50% of workers switched to remote work during the pandemic, and we classify pre-pandemic parents in these occupations in the 2016–2019 waves of ATUS as the comparison group for the remote workers during the

TABLE 1 Employment, family, and demographic characteristics of workers before and during the pandemic, by work location

	On-site sample		Home sample	
	2017–2018	2020	2017–2018	2020
Weekly earnings (\$) ^a	881.56 (724.15)	977.47 (700.70)	1648.52 (799.19)	1520.90 (945.90)
Usual work hours ^a	39.70 (15.32)	40.75 (14.14)	42.31 (12.69)	41.20 (12.30)
Number of children	1.95 (0.93)	1.96 (0.89)	1.93 (0.96)	1.85 (0.74)
Age of youngest child	7.30 (4.94)	6.97 (4.79)	6.94 (5.02)	7.33 (4.95)
% Partnered ^a	0.75	0.74 (0)	0.87	0.85
Age ^a	39.39 (8.03)	39.32 (8.16)	40.65 (7.04)	41.43 (7.55)
% College-educated ^a	0.44	0.41	0.81	0.83
% Female	0.46	0.42	0.47	0.50
% Black ^a	0.09	0.14	0.04	0.05
% Hispanic ^a	0.19	0.23	0.06	0.10
<i>N</i>	979	340	442	276

Note: Estimates are weighted means or percentages, with standard deviations in brackets. “On-site sample” indicates in-person workers in 2020 versus workers in non-telecommutable jobs in 2017–2018 and “home sample” indicates remote workers in 2020 and workers in telecommutable jobs in 2017–2018.

^aA significant difference in 2020 between remote workers and in-person workers at the 5% level. No within-group temporal differences (i.e., between 2017–2018 and 2020) are significant at $p < .05$.

pandemic and (2) we match workers on occupation, education, state, and gender to create comparable samples of pandemic and pre-pandemic workers using exact matching (Iacus et al., 2012). Our results are consistent across the three strategies. We summarize results below and direct readers to Appendix B for more detail.

Regression analyses

We estimate three sets of linear regression models of changing time use patterns by work location and gender: (1) broad categories of time use, (2) specific childcare activities, and (3) paid work time. All models are estimated separately by gender and control for the day of the week, month, age (and its quadratic) and family characteristics, including the presence of a spouse or partner, the number of children, and age of the youngest child. We use these models to generate predicted values of parents' time use by work location and gender that hold constant values of our control variables. We estimate mean time use prior to the pandemic, and differences in time use between 2017–2018 and 2020. On the advice of the BLS, we weight our analyses using the 2020 weights for 2020 and 2006 (standard) weights for 2017 and 2018.

RESULTS

Parents' time in paid and unpaid work

Figure 1 shows results for broad categories of time use: paid work, childcare, child presence, supervisory parenting, and housework. The panel on the left shows predicted time use prior to the pandemic, and the panel on the right shows changes during the pandemic, that is, from May–December 2017–2018 to 2020. Prior to the pandemic, parents in telecommutable and non-telecommutable jobs had similar average workdays, with time spent in paid work longer for fathers versus mothers in each case. During the pandemic, time in paid work generally increased for on-site parents, although changes are not statistically significant (whiskers represent 5% confidence intervals), and fell for parents working from home by 68 min for fathers and 41 min for mothers. Additional analyses show that this change is entirely explained by reductions in commute time (results available upon request).

Parenting changed a great deal during the pandemic, and changes varied by work arrangement. Prior to the pandemic, across work arrangements, mothers spent more time on child care activities, copresent with children, and supervising children. In the pandemic, we see significant changes in childcare only for mothers working on site, who spent 36 fewer min on average per day on childcare than prior to the pandemic, representing a 24% decline (from 150 min per day prior to the pandemic). This decline is puzzling at first glance, given disruptions to care outside the home, although school closures and the curtailment of extracurriculars also reduced the amount of time parents spent dropping off and picking up children and in other childcare activities, such as watching children's sports or going to museums or libraries. There were no statistically significant increases in time spent copresent with children or supervising children among mothers or fathers in the on-site sample. This phenomenon suggests this group was constrained in responding to increased care demands during the pandemic.

Among parents in the home sample, by contrast, there were substantial increases in child presence and supervisory parenting: Time with children increased by 88 min for mothers and 72 min for fathers. Gender differences were not distinguishable from zero at conventional levels (this was also the case for the sample restricted to parents of younger children, although the point estimate of the gender gap is somewhat larger; see Figure A1). Unlike copresence, increases in supervisory parenting differed starkly by gender. Mothers spent 270 min more on

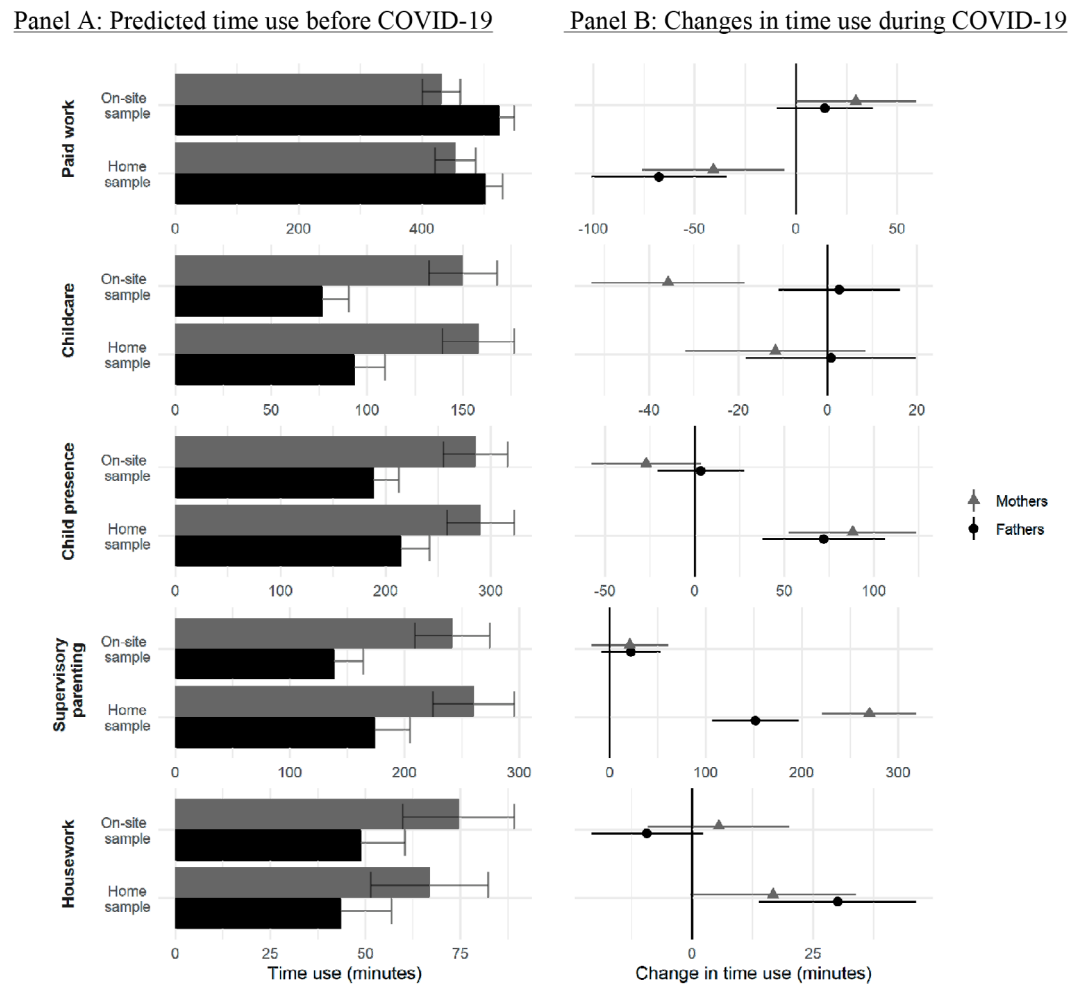


FIGURE 1 Parents' time use before the pandemic and changes in time use during the pandemic. Panel (A) presents predicted time use in May–December 2017–2018. Panel (B) plots changes in time use during May–December 2020 relative to May–December 2017–2018. Models are estimated separately by gender. All estimates are weighted using ATUS sampling weights and include controls for day of the week, month, age (and its quadratic) and family characteristics, including presence of a spouse or partner, number of children, and age of youngest child. “On-site sample” indicates in-person workers in 2020 versus workers in non-telecommutable jobs in 2017–2018 and “home sample” indicates remote workers in 2020 and workers in telecommutable jobs in 2017–2018. “Child presence” indicates children were with or accompanying a parent during an activity. “Supervisory parenting” indicates a child was in a parents' care during non-childcare-focused activities. Whiskers represent 5% confidence intervals.

average with children in their care, which is an 104% increase compared to pre-pandemic levels. At the same time, fathers spent 151 min more with children in their care, an 87% increase compared to pre-pandemic levels. The larger increase in supervisory parenting for mothers than fathers suggests gendered parenting norms shaped pandemic parenting among telecommuters: despite increases of about the same magnitude in time with children, mothers shouldered more responsibility.

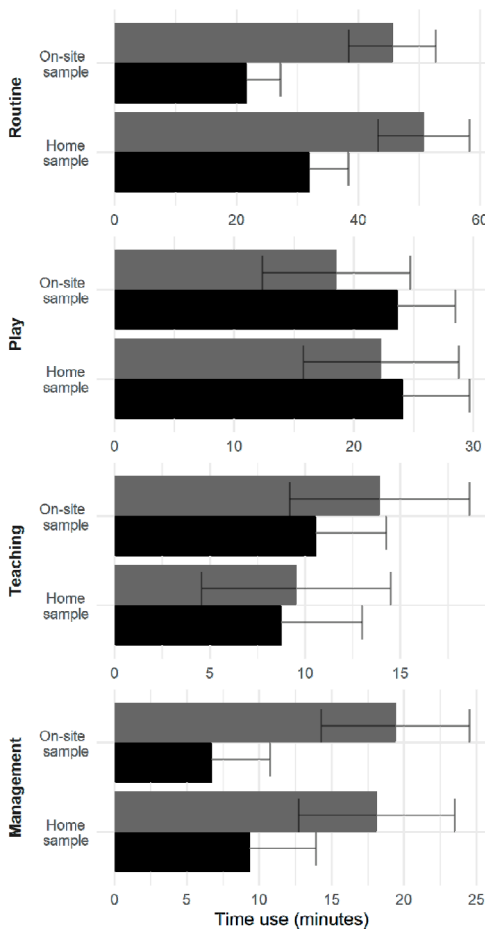
Parents working from home, especially fathers, also increased time spent on housework during the pandemic. Prior to the pandemic, mothers performed much more housework than fathers in both telecommutable and non-telecommutable jobs. During the pandemic, fathers working remotely spent an additional 30 min per day (up from 44 min pre-pandemic), while

mothers spent an extra 16 min per day on housework ($p = .05$). This change contributes to a 13-min reduction in the large gender gap in housework, although this difference is not significant at conventional levels.

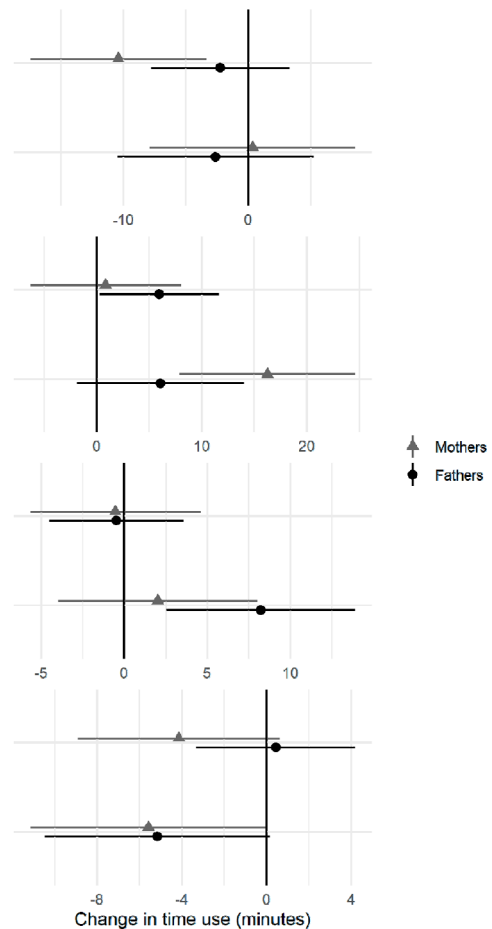
Childcare activities

In the second set of analyses, we examine changes in detailed childcare and parenting activities: routine, play, teaching, and management. Figure 2 plots predicted time use in parenting prior to the pandemic and changes in time use during the pandemic. Prior to the pandemic, mothers

Panel A: Predicted time use before COVID-19



Panel B: Changes in time use during COVID-19



▲ Mothers
● Fathers

FIGURE 2 Parenting activities before the pandemic and changes in parenting during the pandemic. Panel (A) presents predicted time use in May–December 2017–2018. Panel (B) plots changes in time use during May–December 2020 relative to May–December 2017–2018. Models are estimated separately by gender. All estimates are weighted using ATUS sampling weights and include controls for day of the week, month, age (and its quadratic) and family characteristics, including presence of a spouse or partner, number of children, and age of youngest child. “On-site sample” indicates in-person workers in 2020 versus workers in non-telecommutable jobs in 2017–2018 and “home sample” indicates remote workers in 2020 and workers in telecommutable jobs in 2017–2018. Whiskers represent 5% confidence intervals.

tended to do more routine childcare than fathers, and fathers in telecommutable jobs spent more time on routine childcare than fathers in non-telecommutable jobs. During the pandemic, mothers working on site spent 10 min fewer per day on average on routine childcare, a 23% reduction from the pre-pandemic baseline (46 min).

Parents spent similar amounts of time playing with children prior to the pandemic across work locations and, in contrast with other dimensions of childcare, by gender. During the pandemic, fathers in both work locations and mothers working remotely spent more time playing with children, with fathers spending an additional 6 min per day, and remote mothers spending an additional 16 min. For mothers working from home, this represents an increase of 67% over pre-pandemic levels (22 min).

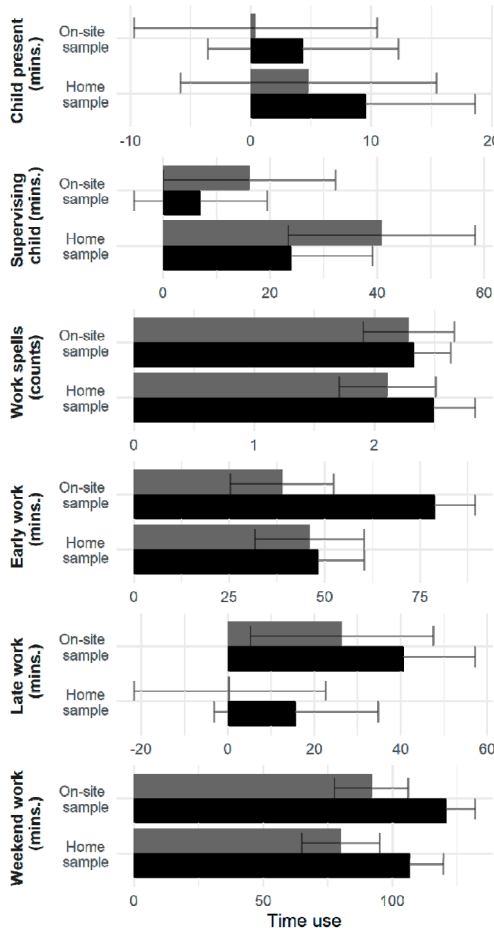
Prior to the pandemic, mothers spent more time teaching children than fathers, across work locations. During the pandemic, the only statistically significant increases in teaching-related childcare were among fathers working from home, who did so for an additional 8 min per day, representing an increase of 94% over the pre-pandemic level (9 min). This reduced the gender gap in time spent teaching children by 6 min ($p < .05$). Prior to the pandemic, mothers spent more time on management activities than fathers, irrespective of work location. During the pandemic, there is suggestive evidence that parents working from home spent a few min less, on average, on management-related childcare (reductions are small, although on a small base, and not statistically significant at the 5% level). Thus, stable aggregate childcare time among parents working from home masks a rebalancing, with parents working from home spending less time on management-related activities, and more time teaching and playing with children.

Paid work contexts

In the third set of analyses, we examine changes in parents' work contexts: child copresence while working, supervisory parenting, work spells, and work outside of 9:00 a.m.–17:00 p.m. weekday hours. Figure 3 plots time use in parents' work contexts prior to the pandemic and their changing paid work contexts during the pandemic. Prior to the pandemic, gender differences in child copresence and supervision by work arrangement were not statistically significant (and levels were low). During the pandemic, parents in the on-site sample did not change the time they spent with children or supervising children while working. Telecommuting parents increased their time with children while working, by about 50 min among both mothers and fathers (gender differences were somewhat larger among parents of children under 13; see Figure A1). Increases in time working while supervising children were greater among this group, with substantial gender differences: telecommuting mothers spent fully 238 additional min on supervisory childcare when working, whereas fathers spent an additional 136 min (both more than fivefold increases over pre-pandemic levels; gender differences significant at the 5% level).

The pandemic also changed how parents schedule their paid work time in gendered ways. Prior to the pandemic, fathers tended to work more spells and more often outside of the 9:00 a.m.–17:00 p.m. weekday work schedule than mothers. Parents with non-telecommutable jobs more frequently worked outside of a standard schedule than their counterparts with telecommutable jobs (differences statistically significant for fathers only at the 5% level). During the pandemic, mothers working on site increased their work time prior to 9:00 a.m., and mothers working remotely increased their work spells after 17:00 p.m. Specifically, an additional 13 min of the work day, on average, fell between 4:00 a.m. and 9:00 a.m. for mothers working on site, an increase of 33% compared to pre-pandemic levels (39 min). For mothers working from home, an additional 30 min of work fell after 17:00 p.m. and before 4:00 a.m., with pre-pandemic levels indistinguishable from zero. Mothers working from home also split their work into an additional 0.45 spells on average, indicating more interruptions (statistically

Panel A: Predicted time use before COVID-19



Panel B: Changes in time use during COVID-19

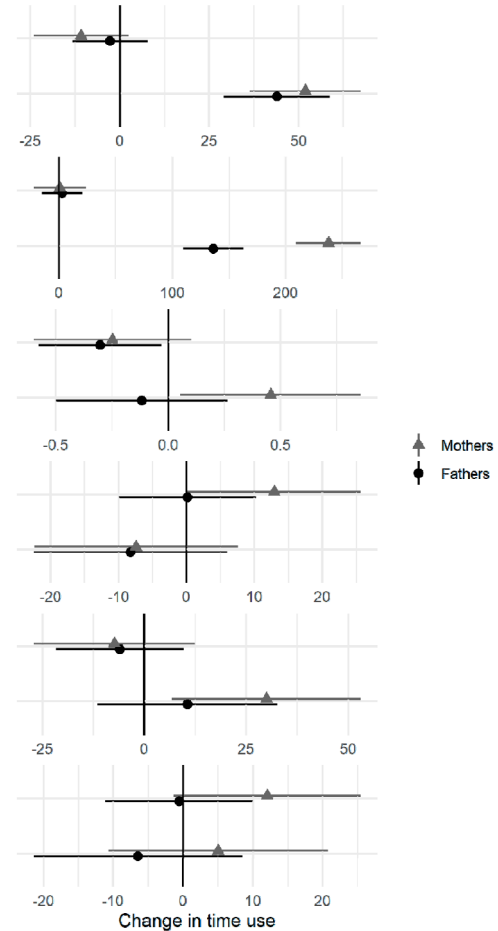


FIGURE 3 Parents' paid work hours before the pandemic and changes during the pandemic. Panel (A) presents predicted time use in May–December 2017–2018. Panel (B) plots changes in time use during May–December 2020 relative to May–December 2017–2018. Models are estimated separately by gender. All estimates are weighted using ATUS sampling weights and include controls for day of the week, month, age (and its quadratic) and family characteristics, including presence of a spouse or partner, number of children, and age of youngest child. “On-site sample” indicates in-person workers in 2020 versus workers in non-telecommutable jobs in 2017–2018 and “home sample” indicates remote workers in 2020 and workers in telecommutable jobs in 2017–2018. Whiskers represent 5% confidence intervals. “Child present” indicates children were with or accompanying a parent during paid work. Whiskers represent 5% confidence intervals.

different from changes in fathers' work spells at the 5% level). These results suggest that mothers were shifting their work schedules to juggle parenting and work during a period in which institutional childcare and informal help were not available to many parents.

Additional robustness analyses

Alongside the alternative matching strategies discussed above and presented in Appendix B, we conduct additional analyses to test the robustness of our findings. First, we assess the sensitivity

of our results to gendered job loss/leaving during the pandemic. Lockdowns led to steep job loss in female-dominated service-sector jobs, and care burdens disproportionately affected mothers' labor force participation (Alon et al., 2020; Montenovio et al., 2022). These patterns are troublesome for our analyses because mothers with high care burdens may be more likely to leave the least flexible jobs. To test the robustness of our results to gendered job loss/leaving, we replicate all analyses except those of paid work activities, but include parents who lost work prior to their diary interviews. We classify these parents into our on-site and remote samples using their most recent occupation, which we identify using their CPS monthly interviews. We use the same occupational measure discussed above to classify these past jobs as on-site or remote. The inclusion of parents who may have been selected out of work does not meaningfully change our results (Figure A5).

Second, and relatedly, we test the robustness of our findings to including only dual-earner couples. The allocation of paid and unpaid work in two-parent families happens in negotiation between partners. Partners' time use and work arrangements may affect both a respondent's probability of working at home and his or her own time use. For example, parents worked longer hours during the pandemic when their partners worked in telecommutable jobs (Musick & Jeong, 2022). We do not observe partners' time use, but we have information on their employment status. Restricting our sample to dual-earning couples yields results very similar to our main findings (Figure A6).

DISCUSSION

Our study is among the first to use time diaries to examine the association between parents' work arrangements and time use in the pandemic. We focus on time use, parenting activities, and paid work environments. We extend the literature by using multiple matching strategies to account for variation in the characteristics of parents that are associated with both work arrangements and time use before and during the pandemic. We present a more complete picture of pandemic-era time use and its relationship to paid work, by considering the composition, timing, and multitasking of parenting. These aspects of parenting provide strong evidence that gendered caregiving norms and the blurring of work-family boundaries have exacerbated gender differences in paid and unpaid work among parents working from home during the pandemic.

Three key findings emerged: First, we found no increase among parents working from home or on site in total childcare time as a primary focus. This was surprising, although consistent with recent Bureau of Labor Statistics (2021) tabulations from the ATUS. It was less surprising given substantial increases in time with children and supervisory parenting, which we observed only among parents working from home. Time with children increased by over an hour among both mothers and fathers in the home sample, and supervisory parenting increased by a full 4.5 h among mothers and 2.5 h among fathers, on average. The much larger increase among mothers relative to fathers in supervisory care points to mothers' disproportionate responsibility for children.

Second, when activities did not involve multitasking or implicate paid work, work from home enabled a modestly more gender egalitarian division of household labor during the pandemic. Fathers took on more household chores, spending an additional 30 min per day on housework (mothers increased their time as well, but by about half as much). Mothers spent disproportionately more time playing with children, one of the most enjoyable forms of childcare (Musick et al., 2016). This pattern differs from evidence prior to the pandemic, showing that remote work was associated with larger gender disparities in housework and smaller disparities in childcare (Lyttelton et al., 2022).

The third key finding is around paid work contexts. For parents working from home, the majority of the increased time spent in the presence of children or on supervising children

during the pandemic was done while working. Mothers and fathers spent just under an additional hour of work time with children present, and mothers spent four more hours of work time supervising children, compared to two more among fathers. Parents working on site experienced no such changes. All mothers—both working on site and at home—also altered their work schedules during the pandemic, increasing nonstandard hours and spells of work throughout the day, presumably to better accommodate increased parenting demands.

Prior research on time use during the pandemic has found that parents increased their domestic labor. Evidence on implications for gender gaps has been less consistent, with some studies concluding that domestic burdens disproportionately increased for mothers (Augustine & Prickett, 2022; Collins et al., 2020; Giurge et al., 2021), and others showing that fathers shouldered an increasing share of household burdens (Carlson et al., 2020; Petts et al., 2021). Studies on how work arrangements shape mothers' and fathers' time use has similarly come to mixed conclusions about their implications for gender gaps in paid and unpaid work (Carlson et al., 2021; Lyttelton & Zang, 2022; Silver, 1993).

Our study extends this line of work: like others, we find that household labor increased during the pandemic, although almost exclusively among telecommuters, with little change in time use among on-site workers. Further, by differentiating time during which parents were focused on childcare from time in which parents were juggling parenting and other tasks—such as paid work—we show that even remote workers were constrained in their responses to the increased parenting demands of the pandemic. No group of parents in our study increased time spent on focused childcare, and remote workers devoted more time to parenting by multitasking. This likely had adverse consequences for both parents and children. For parents, multitasking is associated with worse subjective well-being (Offer & Schneider, 2011), and the very small increase in time spent on education suggests that parents could not devote much time to remote schooling in a period in which children suffered substantial learning loss (Engzell et al., 2021).

By focusing on detailed aspects of parenting in the pandemic, we reveal dimensions of gender inequality not apparent in overall childcare time. Consistent with other studies, we found no overall increase in gender gaps in focused childcare among remote workers (Carlson et al., 2020; Carlson & Petts, 2021). But we found a large increase in gendered parenting *responsibilities*, consistent with recent findings by Augustine and Prickett (2022), for all parents. For remote parents in our sample, the extra time spent on supervisory parenting during the pandemic was 2 h more per day for mothers than fathers. Cognitive labor is a key dimension of the household inequality, with mothers spending more time than fathers anticipating, meeting, and monitoring needs (Daminger, 2019). Our findings suggest that cognitive labor is also an important aspect of inequality in pandemic parenting. These findings further contextualize research that demonstrates negative impacts on the productivity and well-being of female workers during the pandemic (Hiekel & Kühn, 2022; King & Frederickson, 2021; Lyttelton et al., 2020).

In summary, insofar as pandemic-era remote work offered a way to manage increased childcare demands, it also changed how parents—particularly mothers—engaged in paid work, with more time “on call” to attend to children and schedule changes that extended the work day. Working from home thus appears to have provided parents with greater flexibility to respond to new demands at home, but with potential negative effects on work quality and stress experienced disproportionately by mothers, consistent with gendered power relations in negotiations over increased demands at home (Waismel-Manor et al., 2021). Parents working on site during the pandemic experienced relatively small changes in time use, suggesting less blurring of work-family boundaries, but also little flexibility to accommodate changes in family life. Given small changes in their observed time use, an important question for further research is how parents working on site have managed pandemic-related disruptions to schools and childcare. Some likely turned to informal help from older children or grandparents, who have relatively high risk of COVID (Zang et al., 2022). Among couples, their partner may have taken on the bulk of new demands (Musick & Jeong, 2022).

Our study has limitations and leaves open questions for further analysis. First, as noted, the allocation of paid and unpaid work in two-parent families happens in negotiation. Partners' work arrangements and time use may affect respondents' own time in paid and unpaid work, and they may do so differentially by gender (e.g., Musick & Jeong, 2021, 2022). Although our main results were similar for dual-earners, we lack data on partners' time use. Second, although our sensitivity analyses support the suitability of our matching approach, our strategies may not fully remove the variation in time use due to selection. Finally, and relatedly, we do not have adequate sample size to explore the heterogeneity in patterns of school closures, care provisions, and work-from-home policies across geographic locations in the United States (Landivar et al., 2022; Ruppanner, 2020; Ruppanner et al., 2021). This heterogeneity produces variation in the feasibility and demand for supervisory childcare across regions and has policy implications for better supporting parents.

Despite limitations, our findings shed light on important dimensions of inequality during the pandemic: between in-person and remote working parents, and between mothers and fathers. Inequalities across work arrangements have not been adequately addressed in public discourse, and questions remain about working parents' strategies for managing increased childcare demands and the toll they have taken on their economic, physical, and emotional well-being. The pandemic highlights a work culture unaccommodating of care demands and a policy infrastructure ill-equipped to support working parents. Change is needed at both the public and private levels to better accommodate the health, productivity, and well-being of working families.

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