

Telecommuting and gender inequalities in parents' paid and unpaid work before and during the COVID-19 pandemic

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Abstract

Objective: This study examines the relationship between telecommuting and gender inequalities in parents' time use at home and on the job before and during the COVID-19 pandemic.

Background: Telecommuting is a potential strategy for addressing the competing demands of work and home and the gendered ways in which they play out. Limited evidence is mixed, however, on the implications of telecommuting for mothers' and fathers' time in paid and unpaid work. The massive increase in telecommuting due to COVID-19 underscores the critical need to address this gap in the literature.

Method: Data from the 2003–2018 American Time Use Survey ($N = 12,519$) and the 2020 Current Population Survey ($N = 83,676$) were used to estimate the relationship between telecommuting and gender gaps in parents' time in paid and unpaid work before and during the pandemic. Matching and quasi-experimental methods better approximate causal relationships than prior studies.

Results: Before the pandemic, telecommuting was associated with larger gender gaps in housework and work disruptions but smaller gender gaps in childcare, particularly among couples with two full-time earners. During the pandemic, telecommuting mothers maintained paid work to a greater extent than mothers working on-site, whereas fathers' work hours did not differ by work location.

Conclusion: In the context of weak institutional support for parenting, telecommuting may offer mothers a mechanism for maintaining work hours and reducing gender

Abbreviations: ATUS, American Time Use Survey; CEM, coarsened exact matching; CPS, Current Population Survey.

gaps in childcare, while exacerbating inequalities in housework and disruptions to paid work.

KEYWORDS

childcare, gender, inequalities, work, work–family issues

INTRODUCTION

The global pandemic has led to an unprecedented shift to remote work. Prior to the COVID-19 crisis, 16% of US workers reported working some time from home on an average day (Kim et al., 2020; U.S. Bureau of Labor Statistics, 2019). Data collected by the US Census Bureau in August through December of 2020 showed that more than a third of all households—and the vast majority of high-income households—reported working from home more frequently during the pandemic than before (Marshall et al., 2021). Based on a national study from the Pew Research Center, most employees working from home in October of 2020 said they would like to continue to do so after the pandemic, and women were more likely than men to say they would be interested in exclusively working from home (Parker et al., 2020). Telecommuting prior to the pandemic was limited by employers' reluctance to give up direct supervisory control and concerns that the loss of face time would constrain the productive process (Allen et al., 2015; Miller & Rampell, 2013). COVID-19 has changed this in the short term and will likely lead to long-run restructuring and a higher baseline share working from home (Bloom et al., 2020; Eavis & Haag, 2021). The rise of telecommuting raises questions at the intersection of work and home life that are critical for research and policy.

Telecommuting and other work arrangements that provide control over the location or timing of work have been offered as a strategy for addressing the competing demands of work and home—and the inequalities that stem from gendered time commitments (e.g., Gajendran & Harrison, 2007; Goldin, 2014; Ishizuka & Musick, 2021). US workers cite flexibility and control over their schedules as desirable features of work (Brenan, 2020; Mas & Pallais, 2017), and women with children in particular are willing to take wage penalties in exchange for more flexibility in work hours and locations (Mas & Pallais, 2017). This is in the context of a relatively punishing labor market in terms of hours and inflexibility, with little of the institutional support in place elsewhere to mitigate work–family conflict (Gornick & Meyers, 2003; Pettit & Hook, 2009). For mothers, inflexible workplace demands are intensified by enduring gendered expectations of caretaking and housework (Blair-Loy, 2003; Townsend, 2002). Mothers carry a disproportionate share of the work at home, and this is reflected in their weaker labor force attachment and earnings relative to fathers (Kühhirt, 2012; Musick et al., 2020). Evidence on the effectiveness of telecommuting as a mechanism for addressing inequality between mothers and fathers is mixed (for a review, see Allen et al., 2015, see also Glass & Noonan, 2016, Noonan & Glass, 2012, Noonan et al., 2007, Weeden, 2005, Russell et al., 2009).

Various factors complicate our understanding of the link between telecommuting and the gender division of labor at home and work. First, not all telecommuting arrangements increase work flexibility. Taking work home from a day at the office, for example, is a form of telecommuting that extends the work day and yields lower wages relative to on-site work (Glass & Noonan, 2016). Second, the blurrier boundaries between work and home associated with telecommuting may alleviate tension between the two but also interact with gendered expectations of caretaking and housework and leave mothers more vulnerable to work disruptions and multitasking while working at home (Offer & Schneider, 2011; Yavorsky et al., 2021). Finally, estimated effects of telecommuting may be confounded by selection into working from home, both among those seeking greater flexibility for domestic responsibilities and those offered work from home as a reward for high performance (Glass & Noonan, 2016;

Weeden, 2005). These selection processes no doubt shifted during the pandemic, as did many other features of working from home in the context of COVID-19. Parents have had less choice in their work arrangements and less institutional and informal support for childcare and schooling during the pandemic (Collins et al., 2021; Petts et al., 2021; Yavorsky et al., 2021), and they have experienced much greater difficulty working from home without interruption than men and women without children (Marshall et al., 2021). At a time of heightened demands at home, telecommuting may nonetheless have offered more flexibility to manage work and family relative to on-site work. A better understanding of parents' telecommuting before and during the pandemic addresses its potential to ease work–family conflict in a post-pandemic labor market in which work from home is more fully incorporated.

This paper examines the relationship between parents' telecommuting and gendered time commitments to paid and unpaid work. Our main analysis uses two samples of nationally representative time diary data from the American Time Use Survey (ATUS; <https://www.bls.gov/tus/>) to estimate the effects of mothers' and fathers' telecommuting on gender gaps in paid work and household labor before the COVID-19 pandemic. Our supplementary set uses new questions from the monthly Current Population Survey (CPS; <https://www.bls.gov/covid19/measuring-the-effects-of-the-coronavirus-covid-19-pandemic-using-the-current-population-survey.htm>) collected in May to November 2020 to estimate the link between parents' telecommuting and gender gaps in work hours and family-related part-time work during the pandemic. These analyses advance our understanding of telecommuting in three key ways. First, we use innovative methods, including matching and a natural experimental approach, to account for selection into telecommuting and provide leverage in estimating the causal effect of telecommuting on gendered time use. Second, we rely on time diaries to generate finer-grained and more reliable estimates of telecommuting than much past work (Robinson, 2002), including measures of work fragmentation and the copresence of children to tap the quality of work time, and attention to the mix of diary day work at home and the workplace to tap different forms of telecommuting. Finally, this paper provides some of the first estimates of gendered time use by telecommuting status during the pandemic. Broadly, our work responds to calls for predicting and understanding the impact of COVID-19 on gender equality (T. M. Alon et al., 2020).

BACKGROUND

Mechanisms linking telecommuting and parents' time use in paid and unpaid work

Although the issues are not new, telecommuting during the pandemic has highlighted the importance of understanding how working from home shapes parents' time in paid and unpaid work. Work arrangements that provide greater control over the location or timing of work have long been put forward as a potential fix for the work–family conflict that disparately impacts mothers, who continue to do far more care work and housework than fathers (Bianchi et al., 2012; Sayer et al., 2004). To the extent that telecommuting offers greater work hour flexibility, it may make it possible for some mothers to stay in jobs who would otherwise drop out (Goldin, 2014; Ishizuka & Musick, 2021). Like other policies and practices that address work–family conflict, however, telecommuting may have different implications for women and men that ultimately exacerbate some dimensions of inequality (Gornick & Meyers, 2003; Pettit & Hook, 2009). In the case of telecommuting, these may include inequalities in housework and childcare and the quality of work time.

Gendered social norms that underpin the domestic division of labor may differentially shape the effects of flexible work practices like telecommuting. Gendered norms continue to tie fatherhood primarily to full-time employment and motherhood to time-intensive, child-centered

caregiving (Blair-Loy, 2003; Townsend, 2002). One way these play out is in the greater responsiveness of women's time use and labor market attachment to household circumstances such as caregiving needs and spouse work hours (Bianchi, 2000; Musick & Jeong, 2021). Because telecommuting removes the distance between work and home provided by traditional workplaces, it potentially allows more give in managing the competing demands of work and family. Combined with the stronger expectations of childcare and housework, mothers' increased availability working from home may also be tapped more often than fathers' for children's needs or housework.

This dynamic may be further exacerbated by the gendered division of household activities, particularly housework tasks. Women do more routine, time-sensitive tasks such as cooking and cleaning ("female-typed tasks"), whereas men do more infrequent household tasks such as home and vehicle repairs ("male-typed tasks"), which allow more flexibility in scheduling and do not typically disrupt paid work (Noonan, 2001). The exigencies of female-typed housework suggest that telecommuting mothers may disproportionately turn their time to domestic tasks. Mothers are similarly more likely to "cover the goal" in childcare tasks, ensuring needs are met and emergencies attended to, whereas fathers engage in more discretionary activities and outings (Bianchi, 2000; Musick et al., 2016). Nonetheless, evidence suggests that processes shaping mothers' and fathers' time in childcare are different from those shaping time in housework (Kroska, 2003; Sullivan, 2013). Fathers' time in childcare has changed in more meaningful ways than in housework, and increased time availability (measured by work hours) is associated with longer housework hours among mothers than fathers, but comparable increases in childcare hours (Chesley & Flood, 2017). Any increase in parents' availability associated with telecommuting may thus disproportionately increase mothers' housework but lead to more similar increases in mothers' and fathers' childcare time.

Beyond telecommuting's effect on the amount of time spent in paid and unpaid work, the blurrier boundary between work and home and the greater responsiveness of women to family demands may have disparate impacts on the quality of the work environment at home. Mothers spend more time multitasking than fathers, and the additional hours are mainly on housework and childcare (Offer & Schneider, 2011). To the extent that mothers working from home are simultaneously on task to manage children or other household demands, their telecommuting time may be more affected than fathers' by disruptions to work that divide their attention between work and family. We see evidence of this in other domains of time use, with mothers' leisure more often spent in the presence of children and more often interrupted by housework and childcare (Craig & Mullan, 2013; Mattingly & Bianchi, 2003). Gender gaps in interruptions and multitasking may extend to telecommuting time, with potential implications for career advancement and pay.

The mechanisms linking telecommuting and parents' time use in paid and unpaid work may vary across family types in ways that shape their gendered associations. In particular, there may be fewer assumptions about the default caretaking role of mothers in families with two full-time earners. Compared to couples with a male breadwinner, those with two full-time working parents tend to have more egalitarian gender beliefs (Torr & Short, 2004), smaller housework gaps (Craig, 2007; Hook, 2010), and a more equal division of childcare (Craig & Mullan, 2011). Parents in full-time, dual-earning families report greater time pressure than those in families with a part-time or nonworking spouse (Bianchi & Wight, 2011). Mothers and fathers in these family situations may use their telecommuting time more similarly, with smaller gendered implications for their time in paid and unpaid work and their worktime disruptions.

Finally, selection into working from home undoubtedly also shapes telecommuting's associations with mother's and fathers' paid and unpaid work, although in ways that are complicated to predict. Prior to the pandemic, for example, parents who actively sought out telecommuting as an alternative to the workplace may have had time demands at home that were particularly intensive or challenging to combine with a standard workplace schedule. Conversely, parents

who used telecommuting to extend their workday likely had time demands at work that were hard to fit in a standard schedule. Employers also exerted their own rationales on access to telecommuting, for example, to reward self-motivated and high-performing workers (Glass & Noonan, 2016; Weeden, 2005). These selection processes are gendered, with mothers expressing stronger motivations for telecommuting than fathers, often driven by family responsibilities (Mas & Pallais, 2017), and fathers having more access on average to telecommuting (T. M. Alon et al., 2020).

During the pandemic, such selection processes were weaker, with state mandates and safety guidelines leaving many employers and employees with little control over where work could be done. Data from a Pew survey indicated that nearly two-thirds of all men and women working from home all or most of the time in October of 2020 said their workplace was currently closed or unavailable to them (Parker et al., 2020). In contrast to pre-pandemic, women were more likely to telecommute than men during the pandemic (Handwerker et al., 2020). COVID-19 also clearly changed the nature of work from home in ways critical to understanding its gendered effects; notably, school and daycare closings and social distancing mandates left working parents with many fewer institutional and informal supports to manage work and family demands (Collins et al., 2021; Petts et al., 2021; Yavorsky et al., 2021).

Evidence on telecommuting and parents' time use

Evidence on the effects of telecommuting on mothers' and fathers' time in paid and unpaid work prior to the pandemic is limited. At the cross section, data show that telecommuters tended to work longer hours than on-site workers (Noonan & Glass, 2012). These estimates confound potential effects of telecommuting on work hours with selection factors into telecommuting that likely differ for mothers and fathers, as noted above. Fathers telecommuted more often than mothers pre-pandemic, and they more often used telecommuting to extend the workday into overtime hours (Glass & Noonan, 2016). Telecommuting varied by factors that often go unobserved, like motivations for telecommuting and the availability of telecommuting; it was (and remained so in the pandemic) more common among managerial and professional workers with higher salaries and higher educational attainment (Bloom et al., 2020; Parker et al., 2020).

A few studies have relied on panel data to follow mothers (but not fathers) through the transition to parenthood, providing a more focused assessment of how telecommuting may shape work hours. Using two waves of the Understanding Society data from the United Kingdom, Chung and Van der Horst (2018) found that women who had access to telecommuting prior to childbirth were no more likely to remain employed after having a child, but they were somewhat less likely to reduce their work hours. Using data from a US midwestern sample of employed pregnant women, Glass and Riley (1998) examined the association between several employer-provided work-family policies and employment following childbirth, and concluded that telecommuting was not among the most important of these policies in supporting maternal work. In particular, policies associated with hours reduction reduced job-leaving more consistently than policies related to flexibility, including telecommuting.

Based on the same longitudinal sample of midwestern pregnant women, Noonan et al. (2007) examined the relationship between employer-provided policies related to flexibility and time in housework and childcare. They looked cross-sectionally at both mothers' and fathers' housework and childcare, and estimated models of within-person change among mothers, providing a better accounting of unmeasured individual characteristics that may affect both policy use and domestic work. They found fairly weak evidence overall for policy effects, with a few exceptions, including increased childcare time among telecommuting mothers, suggesting that working from home was replacing nonparental childcare for at least part of the

workweek. Results from earlier studies have been inconsistent on telecommuting's association with mothers' unpaid work (Silver, 1993; Silver & Goldscheider, 1994), although consistent in finding null associations with fathers' time in housework and childcare (Noonan et al., 2007; Silver, 1993).

The massive shift to telecommuting in the pandemic has generated new research on work from home and gendered effects on time use. Telecommuting protected US mothers from employment loss during the pandemic, reducing gender gaps in employment relative to on-site workers (T. Alon et al., 2021). In unpaid work, however, gathering evidence suggests that work from home reinforced or exacerbated gender disparities. An online poll conducted for the New York Times in April 2020 showed that although both mothers and fathers increased their time in housework and child care, the division of responsibility remained starkly gendered, even when both partners worked from home. When only one spouse worked remotely, telecommuting fathers reported far less involvement in domestic work than telecommuting mothers, consistent with the idea that gendered norms protect telecommuting fathers (Dunatchik et al., 2021). In line with these findings, a Pew national survey from October 2020 showed that, among telecommuting parents, mothers were twice as likely as fathers to report that they have a lot of childcare responsibilities while performing their paid job (Igielnik, 2021).

In sum, evidence on telecommuting's effect on mothers' and fathers' paid and unpaid work time prior to the pandemic is limited. The rise of telecommuting during the pandemic has led to new attention to this issue, although leaving open critical questions for gender equality in a post-pandemic labor market. Our main analysis expands on the telecommuting literature in significant ways. First, whereas much prior work focuses on women, we include an explicit gender comparison to address how telecommuting is associated with gender gaps in paid and unpaid work. Second, we make innovative use of data to better parse out the causal relationship between telecommuting and time use. Third, we rely on nationally representative time diaries for broader, more reliable, and finer-grained estimates of pre-pandemic time use (Robinson, 2002). Finally, our pandemic analysis provides new information on telecommuting's association with family-related reductions in paid work time.

OUR APPROACH

Drawing broadly on work family literature and evidence specifically on telecommuting, we posit that telecommuting may allow more flexibility to manage competing demands of work and family and result in a more equal sharing of paid and unpaid work between mothers and fathers. At the same time, the combination of stronger normative pressures on mothers as caretakers and the blurring of work-home boundaries may exacerbate inequalities in parents' time use, leaving mothers more on task to attend to household labor. This might be especially the case for housework, which fathers seem more reluctant to take on than childcare (Chesley & Flood, 2017). We expect telecommuting to disproportionately increase mothers' housework hours, multitasking, and work interruptions relative to fathers' and have a more proportionate impact on parents' childcare time, particularly when both partners work full-time. We examine these questions triangulating across data sources and samples and combining descriptive approaches with strategies designed to provide greater leverage on causal questions.

Our main analysis draws from nationally representative time diary data that provide rich details on the context of work that are less prone to error and bias than global recall (Robinson, 2002). Diary data allow us to differentiate between workdays spent entirely at home and those that include a mix of home and on-site work more typical of telecommuting as an extension of the workday (Glass & Noonan, 2016). We can also measure work disruptions, including the number of separate work activities across the diary day (*fragmentation*) and the *presence of children* while working. We estimate gender gaps in time use for parents in a

matched sample and a telecommuting sample of the ATUS, and we examine variation in observed patterns for more egalitarian households with two full-time working parents and households with just a full-time working father.

Our two ATUS samples allow us to better address concerns about selectivity and approximate causal relationships. In our matched sample from the 2003–2018 ATUS, we compare telecommuting parents within occupational categories. This sample includes workers in jobs that could plausibly be done remotely, which is arguably the closest to a post-pandemic world. Models estimated with the matched sample account for the differences in the characteristics of mothers and fathers by telecommuting status that we can observe in the ATUS, but may still potentially be biased by unobserved factors correlated with time use and work location. To better account for unobserved factors, such as preferences for household labor or childcare, we draw on a subset of the 2017–2018 ATUS who report ever-telecommuting. The weekday on which ATUS observes respondents is random, providing a quasi-experiment in which some telecommuters are surveyed on days at home and others on days at work. We use this exogenous variation in diary day telecommuting among mothers and fathers to provide greater leverage on how telecommuting affects housework and childcare over the course of a day. The trade-off is that this relatively small group of ever-telecommuters in 2017–2018 is likely less representative of future telecommuters than the matched sample. Differences in results using these two samples may be driven by unobserved characteristics in the matched sample and/or the differential effects of telecommuting among the universe of workers and ever-telecommuters.

Supplementary analyses rely on the CPS to describe gender patterns in telecommuting during the pandemic. Although we do not have ATUS-equivalent measures of childcare and housework for the pandemic, we have information on telecommuting due to the pandemic, time in paid work, and parents' explanations of underemployment, in particular part-time status due to childcare or other family-related reasons. We use gendered differences in parents' family-related employment decisions resulting from COVID-19 to draw preliminary conclusions about gendered household labor during the pandemic, with potential implications for the future of work and family.

DATA AND METHOD

Data and samples

Our main analysis draws on the ATUS, which provides time diaries and records in detail the nature and context of daily activities for a large representative sample of American workers (Hofferth et al., 2020). It prompts respondents to record their activities, the location of activities, and the presence of others over 24 h. Our ATUS samples include partnered and unpartnered parents ages 21–60 with resident children <18, who worked for an employer for pay and reported regular work hours. We excluded self-employed respondents because the relationship between work and time flexibility is likely very different for workers with and without employers. We also dropped weekend diaries and respondents who worked less than 2 h on the diary day to capture days structured more substantially around work.

Our *matched sample* ($N = 12,519$ parents) draws from the 2003–2018 ATUS and includes two additional sample restrictions to generate plausible counterfactuals for telecommuting: First, we excluded respondents in occupations that cannot be done remotely, identified in our CPS sample as those in which fewer than 5% of workers switched to telecommuting during the pandemic (a list of these occupations is available upon request). Second, we excluded respondents who could not be matched on telecommuting status, that is, in occupational categories without at least one mother and one father working from home, working non-remotely, and splitting their work time between home and work. Our *ever-telecommuter sample* ($N = 405$

parents) uses supplements from the 2017–2018 ATUS that ask telecommuting questions, including: “Are there days when you work only at home?” We restrict this sample to parents who reported ever-telecommuting for a full day.

In supplementary analyses, we use data from the monthly May to November 2020 CPS to document gender gaps in paid work time during the pandemic. The CPS is a survey of approximately 50,000 households each month, and the COVID-19 supplement included additional questions on telecommuting and job-leaving. Like our ATUS samples, our *CPS pandemic sample* ($N = 83,676$ person months) includes parents ages 21–60 with resident children <18 who worked for an employer for pay and reported regular work hours. Table A1 details sample construction for all samples.

Measures

ATUS measures

Telecommuting

We define telecommuting on the basis of respondents working on their main job and reporting that their location was “home.” We divide respondents into three groups: *workplace*, for whom all reported work activities on the diary day were at the workplace; *mixed*, for whom some work activities were at home and others at the workplace; and *home*, for whom all work activities were at home. We tested several other telecommuting taxonomies, including a binary telecommuting/workplace measure and categorization based on the duration of time telecommuting, and we found similar results for each. The 2017–2018 ATUS supplements also include a question “How often do you work only at home?” that allows us to control for the frequency of telecommuting in our ever-telecommuter sample. Table 1 presents descriptive statistics for all samples.

Time use

We define *housework* to include both core housework (such as cleaning, tidying, laundry, and cooking) and ancillary housework activities, such as household maintenance and vehicle maintenance. Prior research finds gender inequalities in both broadly and narrowly defined housework, but larger inequalities in the latter case (Bianchi et al., 2012), so our estimates are likely conservative. We create a measure of *childcare* that 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 parent-teacher association meeting), health (e.g., sitting with a sick child), and associated travel of all minor children. These measurement strategies are commonly applied in the literature (e.g., Musick et al., 2016).

Paid work time

Paid work time is time spent on paid work on the diary day. We construct two measures that indicate competing work demands and divided attention: the fragmentation of work and the presence of children. *Fragmentation* is the number of separate work activities across diary day and captures the extent to which work is divided into spells (Flood et al., 2019). The *presence of children* while working is a summary of the time when respondents’ children were present during work activities, based on the activity-level “who with” question. ATUS began recording copresence for work activities in 2011, so analyses of child presence are based on a 2011–2018 sample ($N = 6177$). Time use outcomes are top-coded at the 99th percentile to decrease the influence of extreme values. We examined the functional form of the relationships between time use and telecommuting by coding time

TABLE 1 Descriptive statistics for matched, ever-telecommuter, and pandemic samples

	Matched (<i>N</i> = 12,519)				Ever-telecommuter (<i>N</i> = 405)				Pandemic (<i>N</i> = 83,676)			
	Fathers		Mothers		Fathers		Mothers		Fathers		Mothers	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Childcare (min)	57.02	72.22	90.20	87.72	65.03	78.78	99.71	91.88	–	–	–	–
Housework (min)	41.28	56.25	72.25	68.69	39.72	48.74	72.67	76.30	–	–	–	–
Paid work (min)	528.40	123.26	469.27	114.21	503.92	122.19	468.59	136.03	–	–	–	–
Paid work last week (h)	–	–	–	–	–	–	–	–	42.28	11.19	36.79	11.43
Family-related part-time work (prop.)	–	–	–	–	–	–	–	–	0.01	–	0.10	–
Child presence d. work (min)	5.03	33.93	9.26	49.17	7.51	41.73	17.88	64.31	–	–	–	–
Work spells	2.57	1.24	2.44	1.16	2.77	2.07	2.71	1.89	–	–	–	–
Weekly earnings (\$)	1458.4	745.30	913.39	620.94	1928.68	718.64	1440.39	774.23	7654	3957	7733	3806
Age	40.80	7.49	38.98	7.56	42.01	7.25	40.57	6.62	40.44	7.18	39.55	7.09
Number of children	2.00	0.90	1.82	0.84	1.94	1.00	1.83	0.90	2.09	1.02	2.00	0.96
Age of youngest child	6.76	5.18	7.85	5.12	7.16	5.60	7.49	4.95	7.41	5.38	8.39	5.38
Usual weekly paid work hours	46.87	9.62	40.18	9.43	45.70	8.85	41.45	10.30	–	–	–	–
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Work location												
Workplace	4753	76	5285	80	120	54	90	49	–	–	–	–
Mixed	1139	18	932	14	49	22	48	26	–	–	–	–
Home	356	6	376	6	52	24	46	25	–	–	–	–
Pandemic telecommuting												
Workplace	–	–	–	–	–	–	–	–	30,939	73	27,914	68
Home	–	–	–	–	–	–	–	–	11,472	27	13,351	32
Education												
No college degree	1990	32	2671	41	26	12	26	14	24,072	57	20,857	51
College degree	4258	68	3922	59	195	88	158	86	18,339	43	20,408	49
Race/ethnicity												
Black	324	5	688	10	9	4	16	9	2973	7	4648	11
Hispanic	495	8	659	10	10	5	11	6	5545	13	4702	11
Other	5429	87	5246	80	202	91	157	85	33,893	80	31,915	77
Couples' work arrangements												
Mother part-, father full-time	3360	54	696	11	109	49	22	12	5374	13	5181	13
Both full-time	2258	36	3241	49	91	41	105	57	19,492	46	20,400	49
Other	630	10	2656	40	21	10	57	31	17,545	41	15,684	38
Spousal employment												
No spouse/partner	516	8	1863	28	17	8	38	21	3802	9	11,336	27

TABLE 1 (Continued)

	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Spouse not full-time	3428	55	782	12	113	51	17	9	17,893	42	4389	11
Spouse works full-time	2304	37	3948	60	91	41	129	70	20,716	49	25,540	62

Note: Data are from 2003–2018 American Time Use Survey (matched sample), 2017–2018 American Time Use Survey (ever-telecommuter sample), and 2020 Current Population Survey (pandemic sample).

use categorically, and the results are highly consistent with the estimates from continuous measures reported below.

Social and demographic characteristics

We control for work and demographic characteristics, as well as family composition. Work characteristics include weekly work hours and weekly earnings. Demographics include age, whether a respondent graduated from four-year college, the age and number of the respondent's children in the household, race/ethnicity (non-Hispanic Black, Hispanic, and neither Black nor Hispanic), whether a respondent is married/cohabiting, and if the spouse/partner is employed full-time (35+ hours per week).

CPS pandemic measures

In May 2020, the CPS introduced a question that asks whether the respondent worked from home for pay at any time during the previous 4 weeks due to the pandemic, and we coded “yes” responses as working from *home*. This measure excludes workers whose telecommuting was not due to the pandemic, for example, who had been telecommuting previously (about 15% of telecommuters prior to 2020 telecommuted full-time, according to our own calculations from the ATUS), and thus likely underestimates to some degree telecommuting during the pandemic. We assess two measures of work time: *Work hours* includes hours worked in all jobs in the week prior to interview. *Family-related part-time work* is a binary measure that captures the extent to which parents moved into part-time work because of childcare and other family/personal obligations.

Analytical strategy

Estimates based on the matched sample

Our matched sample was constructed using coarsened exact matching (CEM). Like all matching methods, CEM aims to achieve balance on key variables between treatment and control groups, and in doing so reduce model dependence (Iacus et al., 2012). This is achieved by sorting observations into groups based on a matching variable (or variables) and discarding those that do not include all treatment and control groups. In our case, we match on occupation and discard strata that do not include the six combinations of our work location variables (workplace, mixed, home) by gender. Matching on detailed occupation alone excludes two-thirds of the sample, so we first match by detailed occupation and, for those not initially matched, by a coarsened set of 22 occupational categories. This creates a sample in which it is

possible to compare the time use patterns of parents working from home and the workplace in similar jobs.

Using the matched sample, we estimate models of time use by gender and work location. We control for family and demographic characteristics that may select respondents into telecommuting, including age (and its quadratic), number and age of children, relationship status, spouse/partner's employment, race/ethnicity, education, and year. For all outcomes except work time, we also control for weekly earnings, usual weekly work hours and working part-time. All models are fully interacted with gender (making them identical to models estimated separately for mothers and fathers), and all estimates incorporate sampling weights. Sensitivity analyses assess variation in telecommuting's association with housework and childcare among partnered parents by their joint employment status, in particular, examining the notion that telecommuting may have a more gender equal effect on unpaid work among dual full-time earning parents, relative to couples in which the mother works part-time (there are too few couples with a part-time employed father to analyze separately, see Table 1).

Estimates based on the ever-telecommuter sample

We estimate an analogous set of models to our main matched models with our ever-telecommuting sample. Due to smaller samples, we do include interactions between controls and gender; we include only the interaction between gender and telecommuting status to assess gender differences in time use by telecommuting status. A key assumption of our estimation strategy is that, among this sample of mothers and fathers who report days when they work from home, selection into telecommuting on the diary day is unlikely driven by an inability to telecommute. Thus, after adjusting for the frequency of telecommuting, we should have two random groups of ever-telecommuters who do not differ systematically, with one group assigned to work from home and the other to work in the workplace. To test this assumption, we examined the observed differences between the two groups and found that only spousal employment varied substantially, which we include as a control in our models. Table A2 presents T tests of these comparisons.

Estimates based on the pandemic sample

Because transitioning to working from home is arguably exogenous for many workers during the pandemic, we present descriptive means and differences in means to examine whether the shift to telecommuting following the onset of the pandemic has equally impacted mothers and fathers. While we do not have ATUS-equivalent time use measures for this sample, we are able to estimate gender gaps in paid work hours and family-related part-time work by work location. The CPS interviews households for up to four consecutive months, so we cluster standard errors at the respondent level, and use the CPS monthly sampling weights.

RESULTS

Telecommuting prior to the pandemic

Figure 1 plots time use by gender and telecommuting status from our matched sample. Panel A shows predicted time use by gender, and Panel B shows predicted differences in time use between mother and fathers. Estimates are derived from OLS models of time use with our full set of controls; full model results are shown in Table A3.

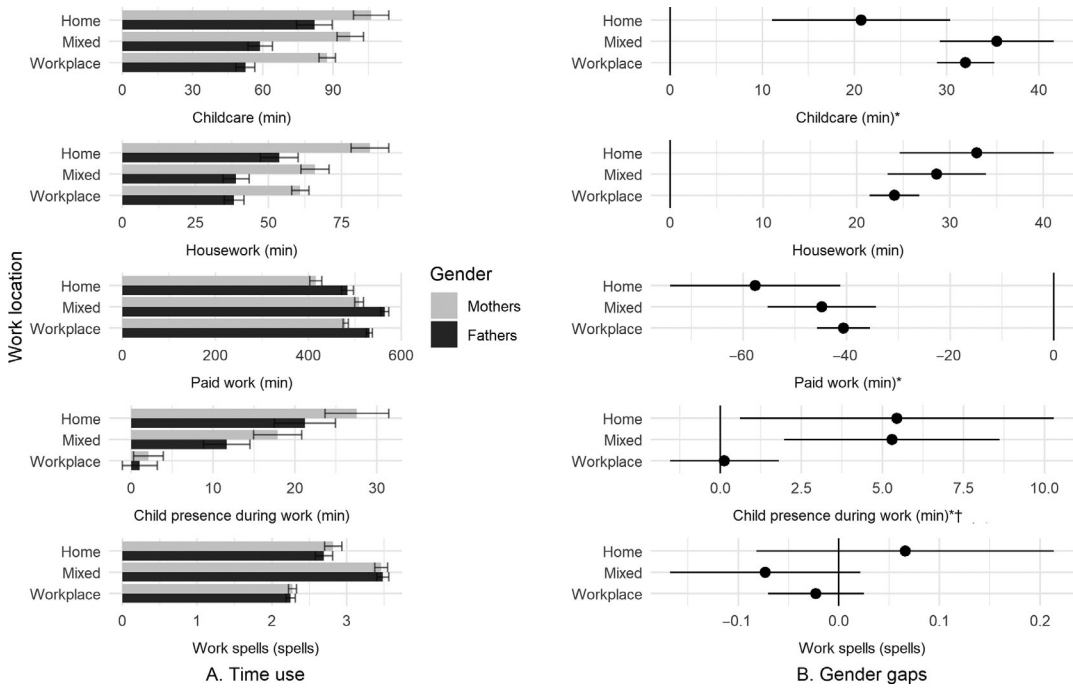


FIGURE 1 Predicted parents' time use by work location and gender. Data are from the 2003–2018 American Time Use Survey matched sample, $N = 12,519$. Panel A shows predicted time use by gender, and Panel B shows predicted differences in time use between mother and fathers. Predicted values are derived from ordinary least squared regression models with controls for age, race/ethnicity, education, earnings, partner status, and number of children, $*p < .05$ difference between home and workplace gender gaps in matched estimates. $^{\dagger}p < .05$ difference between mixed and workplace gender gaps. Full models are presented in Table A3

Panel A shows that mothers and fathers who work from home only spent more time on both *childcare* and *housework* than parents in the workplace or who split their time between locations. Mothers working from home only during the diary day spent on average 106 min on childcare and 85 min on housework, compared to 82 and 54 min among fathers working from home, respectively. Mothers in the workplace spent, on average, 87 min on childcare and 61 min on housework, whereas fathers spent 52 and 38 min, respectively. Mothers who split their time between home and the workplace spent, on average, 97 min on childcare and 66 min on housework, whereas fathers spend 59 and 39 min, respectively.

The relationship between gender gaps in time use and work location were quite different for housework and childcare, as shown in Panel B. Gender gaps in childcare were significantly smaller among parents working from home only versus the workplace, by 11 min (i.e., mothers working from home did about 20 more minutes of childcare than fathers working from home vs. over 30 more minutes among mothers and fathers working on-site). Gender gaps in housework, by contrast, were significantly larger among those working from home, by 9 min relative to those working on-site. Gender gaps in childcare and housework for parents who split their time between home and the workplace were similar to those for parents in the workplace.

Mothers and fathers who work from home only spent substantially less time in *paid work*, on average, than mothers and fathers in the workplace, with home-only mothers working 64 fewer minutes and home-only fathers 47 fewer minutes, relative to mothers and fathers in the workplace, respectively (Panel A). Parents who split their time between home and the workplace worked the longest hours, with fathers working an additional 33 min compared to fathers exclusively in the workplace, and mothers working an additional 28 min, consistent with the

notion that this form of telecommuting often serves to extend the workday (Glass & Noonan, 2016). Relative to the workplace only, the gender gap in paid work time was 17 min larger and statistically significant for parents working from home only, whereas gaps for parents who split their time between home and the workplace were similar (Panel B).

Work disruptions were far more common among telecommuters than parents in the workplace. Mothers and fathers working from home had children present during worktime for 28 and 21 min, respectively, and mothers and fathers who split their time between home and the workplace had children present for 18 and 12 min. This is compared to just a few minutes on average for parents in the workplace (Panel A). Gender gaps in child presence were on average 5 min larger for both exclusive telecommuters and parents splitting their time between home and the workplace, with both gaps statistically significant (Panel B). Despite working shorter workdays, mothers and fathers working from home also experienced more fragmentation of their workday, working on average 0.4 and 0.5 additional spells compared to parents in the workplace (Panel A). Gender gaps in work spells did not differ significantly among those working from home, the workplace, or both (Panel B).

Estimates from our ever-telecommuter sample shown in Table 2 provide further evidence that work location shapes gender inequalities in time use. The interaction terms between gender and work location provide estimates of gaps in time use between mothers and fathers working at home only and those splitting their time between home and the workplace, relative to parents working in the workplace only on the diary day. Gender gaps in *childcare* among parents working from home only were 40 min smaller than those working on-site only, and gender gaps in *housework* were 37 min greater (both differences are statistically significant). This pattern is consistent with key findings from our matched models, although the magnitude of differences is larger. Among parents who split their time on the diary day between home and the workplace, there were no differences in childcare gaps relative to parents in the workplace, and housework gaps were larger, on a scale similar to parents working from home only.

Again, consistent with the matched sample, gender gaps in *paid work* time appeared larger on home-only work days (with telecommuting mothers working less), although here the

TABLE 2 Time use by gender and work location among ever-telecommuters

	Childcare	Housework	Paid work	Child presence during work	Work spells
Work location: (reference = workplace)					
Mixed	-4.93 (12.53)	-5.30 (9.75)	62.46** (20.90)	17.36* (7.42)	0.41 (0.35)
Home	57.58** (15.47)	-13.02 (12.03)	-22.16 (25.79)	22.34* (9.16)	-0.93* (0.44)
Mother (vs. father)	39.66** (11.50)	7.19 (8.95)	-10.24 (19.17)	-2.91 (6.81)	-0.61 (0.32)
Mother × work location: (reference = workplace)					
Mixed	-2.07 (18.69)	38.09** (14.54)	-73.96* (31.16)	17.36 (11.07)	1.74** (0.53)
Home	-39.60* (19.69)	36.83* (15.32)	-28.84 (32.84)	23.27* (11.66)	0.86 (0.56)
<i>N</i>	405	405	405	405	405

Note: The models are estimated using ordinary least squares regression. Spousal employment and frequency of telecommuting are included as controls and are not interacted with gender.

** $p < .01$; * $p < .05$.

difference is not statistically significant. For parents who work in both locations, the gender gap was 74 min, and this difference is significant. Gender gaps in *work disruptions* were also larger for telecommuters in this sample. The gender gap in working with a child present was statistically significantly larger among parents working from home only relative to those in the workplace only, by 23 min. And the gender gap in work spells was statistically significantly larger for parents who split their time between home and the workplace relative to those in the workplace only, by 1.7 spells.

To summarize, relative to working on-site, working from home only was associated with decreased gender gaps in childcare and increased gender gaps in housework across samples. Results are suggestive but more uncertain in relation to paid work time, with estimated gender gaps in both samples larger for parents who work from home only, but imprecise in the ever-telecommuter sample. Across samples, mothers also experienced disproportionately more work disruptions when working from home. Estimates of gender gaps in time use were typically larger in the ever-telecommuter sample. It is possible that the ever-telecommuters are more able to structure their schedules such that they spend more time on household labor on telecommuting days than on non-telecommuting days. As noted earlier, the ever-telecommuter sample is also a narrower group than the potential telecommuters represented in the matched analysis, which may further play into estimates of effect sizes.

Heterogeneous effects by couples' work arrangements

In sensitivity analyses, we assess variation in telecommuting's association with housework and childcare among partnered parents by their joint employment status. We compared two subgroups: (1) parents both working full-time, and (2) fathers working full-time and mothers working part-time. For families in which both parents work full-time, results reflected those of the full matched sample (see Figure A1 for full set of predicted values): Relative to parents working on-site, childcare gaps were significantly smaller for parents working from home, and housework and work disruption gaps appear larger, although do not meet standard levels of statistical significance. For families in which mothers work part-time, estimated gender gaps in childcare appear *larger* among those working from home versus the workplace, in contrast to our main results, although differences are not statistically significant. Gender gaps in housework and work disruptions among those working from home were statistically significantly larger than gaps among those working on-site, consistent with our main results. Overall, this assessment provides a fairly consistent pattern of estimated effects across couple-level work arrangements, with some suggestive evidence that telecommuting does more to reduce gender gaps in childcare when both parents are employed full-time.

Telecommuting during the pandemic

Drawing from COVID supplements to the CPS, Figure 2 explores the relationship between paid work hours among parents between May and November 2020 working frontline jobs or newly telecommuting. Panel A plots unadjusted mean hours worked last week and the proportion of mothers and fathers working part-time for family reasons, and Panel B plots the difference in means between mothers and fathers in work hours and shifts to part-time work. These data allow us to differentiate between those who worked from home for any reason over the last 4 weeks due to the pandemic and those who did not.

Telecommuting was associated with more paid work hours among mothers and fewer among fathers (Panel A): Mothers working from home worked on average 39 h per week and 37 h when working from the workplace, whereas fathers worked 42 and 43 h per week,

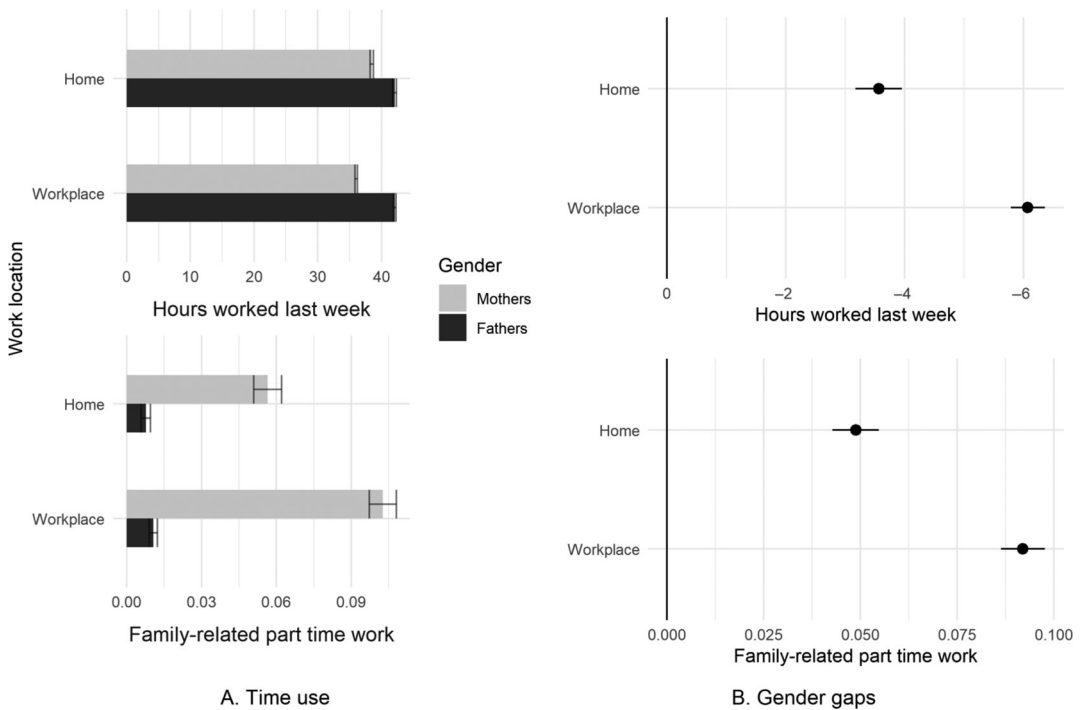


FIGURE 2 Gender gaps in work time by work location during the pandemic. Data are from the May–November 2020 Current Population Survey pandemic sample, $N = 83,676$. Panel A shows time use by gender, and Panel B shows differences in time use between mother and fathers. Estimates are unadjusted means/proportions and differences in means/proportions

respectively. We also see gender differences in associations between telecommuting and shifting to part-time work for family-related reasons: 5% of telecommuting mothers and 9% of non-telecommuting mothers worked part-time because of family reasons, whereas for fathers in any location the figure is 1%. This translates into smaller gender gaps in work hours and shifts to part-time work for family-related reasons for telecommuting versus non-telecommuting workers (Panel B): Gender gaps in paid work hours were 2.5 h per week smaller for telecommuting mothers than for non-telecommuting mothers, and gender gaps in part-time work for family reasons were 3.5 percentage points smaller for mothers working from home.

These findings suggest that mothers who newly worked from home during the pandemic were better able to maintain work hours than mothers in the workplace, but they also point to gender inequalities in care responsibilities. Although the CPS does not have data on unpaid work hours, the lack of change in fathers' work hours with work location, despite school closures and various disruptions to formal and informal care networks, indicates that fathers are less responsive to the competing demands of home and work (e.g., Musick & Jeong, 2021).

CONCLUSION

The COVID-19 crisis has resulted in an unprecedented shift to remote work, and at least some of the pandemic-related shift to telecommuting is likely to persist for some time. We explored the implications of telecommuting for gender equality in parents' paid and unpaid work. We reasoned that on the one hand, telecommuting may give mothers and fathers more flexibility to

manage competing demands of work and family and result in a more equal sharing of paid and unpaid work. On the other hand, the combination of stronger normative pressures on mothers as caretakers and the lack of physical separation between work and home may leave mothers more on task to attend to household labor and exacerbate inequalities in parents' time use. Studies investigating these questions prior to the pandemic produced inconsistent results (e.g., Noonan et al., 2007; Silver & Goldscheider, 1994), and early reports of pandemic-related work and care dislocations on gender gaps in household labor have also been mixed (Carlson et al., 2020; Miller, 2020). This paper advances our understanding of telecommuting in significant ways, by including an explicit comparison of paid and unpaid work and the potential trade-offs associated with telecommuting; making innovative use of data to better assess causality; and relying on nationally representative time diaries for broader, more reliable, and finer-grained estimates of pre-pandemic time use.

Our analysis of time use data prior to the pandemic provides some evidence in support of the idea that telecommuting reduces gender disparities at home. We show that on diary days worked exclusively from home, mothers and fathers spend more time in childcare than on days at the workplace, and the difference is disproportionately large for fathers, particularly when both parents work full-time. However, we also find that working exclusively from home on the diary day is associated with larger increases in housework among mothers than fathers, resulting in greater gender gaps in housework. Discrepant findings in these two domains are consistent with prior evidence on differences in the processes governing mothers' and fathers' time in housework and childcare (Chesley & Flood, 2017). Parents experience greater enjoyment and meaning in time with children than in most other daily activities (Musick et al., 2016), and fathers have been more responsive to childcare needs than those related to the more onerous aspects of housekeeping (Altintas & Sullivan, 2017; Goldscheider et al., 2015).

Time diary data further suggest that working exclusively from home is associated with larger gender gaps in paid work time (although results from the ever-telecommuter sample miss conventional levels of statistical significance). Across samples, we found consistent evidence that working from home increases work time in the presence of children and does so disproportionately for mothers. Detailed data on the sequencing of activities and presence of others in activities shed new light on the nature of telecommuting. Critically, these data allowed us to measure gendered differences in disruptions to work time—a critical dimension of work that may adversely affect mothers' productivity and stress (Lytelton et al., 2020). It also allowed us to parse out telecommuters who spent part of their day at home and part in the workplace. Consistent with prior literature (Glass & Noonan, 2016), this form of telecommuting appears to more often extend the workday, resulting in longer work hours among this group than either those working exclusively from home or the workplace. The unpaid time of these telecommuters tended to look more similar to those who worked exclusively on-site.

COVID-19 led to a massive increase in telecommuting and simultaneous breakdown in institutional support for families with children, resulting in unprecedented challenges in managing work and caregiving for many (Collins et al., 2021). Our analysis of paid work from May to November 2020 showed that newly telecommuting mothers were working longer hours and were less likely to be working part-time for family reasons than non-telecommuting mothers, whereas fathers' work time was not responsive to work location. These results are consistent with T. Alon et al.'s (2021) description of women's work hours in the pandemic, and suggest that telecommuting provided a mechanism for mothers to maintain work hours. Longer work hours among telecommuting mothers is an important finding, and greater flexibility to manage work and family demands is a plausible explanation. Other explanations with less favorable implications, however, are also plausible. For example, mothers may put in longer hours to compensate for the more frequent interruptions to their work time from home; they might also be driven by efforts to meet the heightened scrutiny employers apply to women's work from home relative to men's. Longer work hours among telecommuting

mothers are also in the context of substantially more labor force withdrawals and reductions in paid work time for family-related reasons among mothers than fathers, irrespective of work arrangement (Heggeness, 2020; Landivar et al., 2020). They exemplify a pattern that extends beyond the pandemic: “When unexpected family needs arise, mothers step in” (Miller, 2020).

Putting the evidence together, the answer to whether telecommuting results in a more or less equal sharing of paid and unpaid work between mothers and fathers involves trade-offs. Our finding that telecommuting parents report smaller gender gaps in work hours and family-related changes to work relative to frontline mothers suggests that telecommuting may allow some mothers to maintain work hours who would otherwise reduce their work time or cut back to part-time status. Our assessment of time diaries prior to the pandemic shows that it disproportionately increases childcare time for fathers, closing the gender gap in childcare hours relative to parents working on-site. The trade-offs for telecommuting mothers include lost wages resulting from time diverted from paid to unpaid work (Van den Berg et al., 2006). They also include disruptions to paid work time, which were greater among telecommuting mothers than fathers even prior to the pandemic and its school and daycare closures. Multitasking and work interruptions are associated with emotional strain and role conflict (Offer & Schneider, 2011), and may be contributing factors to the higher anxiety, loneliness, and depressed feelings reported by telecommuting mothers versus fathers during the pandemic (Lyttelton et al., 2020).

This study sheds new light on telecommuting, nonetheless is limited by data constraints that leave more research to be done. First, our pandemic analysis is limited to paid work time, as our data do not allow us to directly examine gender gaps in childcare or housework by telecommuting status. Second, because the ATUS does not include information on telecommuting of others in the household, we are not able to consider partners’ telecommuting status, or examine the dynamics of dual-telecommuting households, which COVID-19 has made relatively common. Nor do we examine the relationship between telecommuting and care for adult family members, as our sample size precludes it. Prior research shows adult care to be gendered, and this may be exacerbated by telecommuting (Kahn et al., 2011). Third, our causal estimates from the ever-telecommuters sample rely on the assumption that our observation of telecommuting is randomized after adjusting for telecommuting frequency. Potentially more limiting for drawing conclusions relevant to the pandemic and beyond, these estimates are based on a sample of regular telecommuters, and they may not generalize to what has become a much broader group of workers. Here, our matched sample does a better job, and results across these samples are consistent. Finally, our study provides only limited insight into why telecommuting leads to gender disparities in time use. Understanding the source of gender gaps among telecommuters during COVID-19 is an important task for further research, and one that is likely to have sustained impact.

Telecommuting will likely become a more common part of work and family life after the pandemic. Maintaining office space is costly for organizations, and for some the shift to remote work during the pandemic has provided a test case for the benefits of a remote workforce. A recent survey found that 56% of hiring managers feel that remote working during the pandemic has gone better than expected, and more hiring managers say remote work has increased than decreased productivity (Ozimek, 2020). The pace of technological innovations related to remote work has also increased markedly (Bloom et al., 2020), signaling greater capacity and productivity in remote work moving forward. One recent study estimated that after the pandemic 22% of work days will be remote (Barrero et al., 2020). Our findings point to gendered trade-offs in telecommuting before and during the pandemic and provide insight into how greater choice in work location might play out post-pandemic.

The current crisis has shed harsh light on the weaknesses of our institutional support system for families. Other rich countries outside the United States do much more to alleviate conflicts between work and family that fall disproportionately on women, including subsidized care work, paid sick leaves for families with children, and recognition in the workplace that men as

well as women need more flexibility in work hours to care for children (Gornick & Meyers, 2003; Musick et al., 2020; Seegert, 2017). Addressing these gaps is a critical task both for reducing gender inequalities in work and supporting the next generation. Compared to pre-pandemic, telecommuting will likely become more common post-pandemic, and the reopening of schools and social networks will mitigate the strains of working from home associated with COVID-19. It will take a stronger infrastructure of care in this country (Slaughter, 2021), however, to fully address the gendered trade-offs that have long factored into how US families manage the competing demands of work and family.

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SUPPORTING INFORMATION

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