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School Closures, Teleworking, and Remote Schooling During the Pandemic

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Abstract

The pandemic resulted in a very large increase in teleworking. In addition, school closings led to a large number of students attending school remotely. An NLSY97 COVID-19 pandemic supplement in the spring of 2021 makes it possible to examine the relationship between these two occurrences. My findings indicate that remote schooling led to a sizable increase in the likelihood of working at home 10 hours or more. After controlling for endogeneity, there is no indication of reverse causation. The responsiveness of teleworking to remote schooling depended crucially on how suitable an individual's job was to teleworking. In jobs that were very poorly suited to teleworking, remote schooling had no effect on the likelihood that an individual teleworked. But in jobs that were well suited, the effect on the likelihood of teleworking was as great as 13 percentage points. Furthermore, remote schooling had a substantially larger effect on the likelihood that women worked from home than the likelihood that men worked at home. While parents no longer need to contend with remote schooling, the flexibility allowed by jobs that are well suited for teleworking enables individuals in such jobs to better meet the demands of childcare and other household responsibilities

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I. Introduction

The Covid-19 pandemic triggered a large increase in the amount of time that employees spend working at home. For example, analyzing data from the American Time Use Survey (ATUS) and the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79), Dey, Frazis, Loewenstein, and Sun (2020) estimate that immediately prior to the pandemic only a little more than 10 percent of workers teleworked one or more days per week. In comparison, an analysis of a COVID-19 supplement of the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97) by Aughinbaugh, Groen, Loewenstein, Rothstein, and Sun (2023) finds that during February to May 2021, 46 percent of workers teleworked at least some of the time during the week before they were interviewed while 25 percent teleworked the entire week.

Teleworking rates have fallen from their height at the start of the pandemic, but teleworking is still far more common than before the pandemic. In point of fact, results from the Bureau of Labor Statistics' Business Response Survey indicate that in August-September 2022, 11.1 percent of private-sector establishments had all of their employees teleworking all the time, and 16.4 percent had some of their employees teleworking some of the time. And according to the estimate in the Bureau of Labor Statistics' Current Population Survey, 21.9 percent of workers teleworked at least some hours during the December 2023 survey week.

There is little doubt that telework rates will remain far above their pre-pandemic rates. In accord with one's intuition that working at home at least some of the time not only reduces commuting costs, but also can result in an improved work life balance, Pabilonia and Vernon's analysis of pre-COVID-19 ATUS data finds that teleworking provides workers with greater flexibility in scheduling their hours and enables them to spend more time with their family. In their survey of Americans, Barrero,

Bloom, and Davis (2021), find that many workers have a strong preference for being able to work at home and feel they are more productive than at the worksite. Aksoy, Barrro, Bloom, Davis, Dolls, and Zarate (2022) come to the same conclusion with their international survey.[1] Specifically, Aksoy et al. (2022) find that workers on average value the option to work from home 2-3 days per week at 5 percent of pay and that this option is higher for women and for individuals with children under 14.[2]

Another important feature of the pandemic was school closures to limit the spread of COVID-19. All U.S. public school buildings were closed by March 25, 2020.[3] [4] School disruptions continued well into the following school year. As indicated by the National Assessment of Educational Progress Monthly School Survey, in February 2021 only 49 percent of public schools with fourth or eighth grade were open full time and in person for all students. By May 2021, this percentage was still only 63 percent. Schools not only provide children with reading, math, and writing skills. Schools also serve as de facto child care providers and their closure forced parents to find alternative arrangements. In many cases, parents themselves had to take on the role of supervising their children and helping them deal with the challenges of distance learning. One might expect that the flexibility provided by teleworking could have been of great help in this regard. Consistent with this, Pabilonia and Vernon (2022) find that teleworkers spend more time with family on work at home days than on office days.

[1] As has often been pointed out, there is a potential cost to remote work resulting from reduced worker interactions. Another issue stems from the fact that workers' preferences toward remote work vary widely. As noted by Aksoy, Barrro, Bloom, Davis, Dolls, and Zarate (2022), the solution and the developing norm appears to be a hybrid model where workers work at home some of the time and in office some of the time.

[2] However, Barrero, Bloom, and Davis' (2021) regressions yield small and statistically insignificant coefficients on children under 18 in the household.

[3] "The coronavirus spring: the historic closing of U.S. schools (a timeline)," *Education Week*, July 1, 2020, https://www.edweek.org/leadership/the-coronavirus-spring-the-historic-closing-of-u-s-schools-a-timeline/2020/07.

[4] Heggenes (2020) finds that at the start of the pandemic, women with school age children in states where schools shut down by March 12 experienced a significant fall in employment

In spring 2021, the NLSY97 fielded a supplement on the effects of the COVID-19 pandemic. The supplement interviews were conducted from February to May 2021. The supplement data include information on employment, telework, health, and children's schooling. NLSY97 respondents were between ages 36 and 41 at the time of the supplement. Aughinbaugh, Groen, Loewenstein, Rothstein, and Sun (2023) provide a detailed description of the supplement.[5] For present purposes, key pieces of information collected by the survey are the hours that individuals worked and teleworked in the week prior to the survey, whether children attended school in person or remotely, and job characteristics that determine how suitable an individual's job is for teleworking.[6]

The NLSY97 COVID-19 survey offers a unique opportunity to study the relationship between remote schooling and teleworking. While parents no longer need to contend with remote schooling, an analysis of the relationship between remote schooling and parents' teleworking decision provides insights into how the flexibility allowed by teleworking enables individuals to better manage the demands of childcare and other household responsibilities. Furthermore, the advantages of teleworking are not available to all workers. Only a minority of jobs are well suited to working at home; the majority must be performed on site. Generally, teleworking is more feasible in the more highly skilled, higher paying jobs. The NLSY97 COVID-19 survey enables one to examine how the characteristics of individuals' jobs determine their ability to use teleworking to cope with remote schooling, and by implication other household demands on their time.

[5] Aughinbaugh, Groen, Loewenstein, Rothstein, and Sun (2023) show that the incidence of working at home and the incidence of remote schooling are positively correlated. However, they shy away from causal estimates because of the concern that both variables are endogenous. I provide a more thorough investigation as well as addressing the endogeneity issue in the analysis that follows.

[6] For a detailed discussion and look at the task information in the NLS, see Dey, Matthew, Mark A. Loewenstein, and Hugette Sun (2021).

The next section provides a description of the data in the NLSY97 supplement as well as of additional data that I bring in from other sources. I then present OLS, IV, and reduced form estimates in Section III. Concluding remarks can be found in Section IV.

II. Data Description

The analysis in this paper is based on individuals who participated in both the NLSY97 COVID-19 Supplement and the previous NLSY97 round 19 data collection. The sample in this paper is identical to that in Aughinbaugh, Groen, Loewenstein, Rothstein, and Sun except for the fact that the sample here is further refined by dropping observations in which an individual does not work or in which there is missing teleworking information. Most of the analysis in this paper is based on the subsample of individuals who have children in school, but I also make use of the non-schooling subsample of working individuals to obtain a single variable measuring how well suited an individual's job is for telework. After deleting observations with missing data and where the individual did not work during the week prior to the survey, the schooling subsample has 2,189 observations.[7] The non-schooling subsample has 1,729 observations.

Table 1 presents summary statistics for the variables used in this paper. Here I highlight several variables that are key to the analysis or that come from sources other than the NLSY97. The teleworking variable used throughout this paper is the number of hours the respondent worked at home in the week prior to the interview. In the analysis that follows, I use as a teleworking variable an indicator variable that equals 1 when the respondent worked at least 10 hours at home in the week prior to the survey. There is admittedly some arbitrariness to the choice of any cutoff, but I want to exclude incidental teleworking of just a few hours. There is quite a bit of bunching at 10 hours, so it seems a reasonable

[7] As do Aughinbaugh, Groen, Loewenstein, Rothstein, and Sun (2023), I also exclude from the schooling subsample individuals all of whose children attended home schooling since these children would not have been subject to remote schooling.

cutoff point. There is also bunching at 20, 30, and 40 hours, but requiring such a high number of hours seems unduly restrictive. The key results are virtually identical if one chooses an 8 hour cutoff. Results are similar for a cutoff of 20 hours, but the instrumental variables and reduced form estimates are a little less precise.

The survey has information on whether any children in the household were enrolled or educated in a public school, a private school, or a home school. In addition, the survey has information on whether children in the household attended any classes in person and whether they attended any classes remotely.[8] In addition, the NLSY97 has useful information on the composition of the respondent's household. I use variables indicating whether there are children younger than 6 and between ages 6 and 17 in the household.

Information on how suitable an individual's job is for working at home comes from three sources. First, in the previous round 19 data collection, individuals were asked about the tasks they performed on the job. For example, there is information on whether half their day or more is spent doing physical tasks and whether there is a great deal of face to face contact with people other than co-workers or supervisors.[9] Second, the NLS has information on an individual's occupation. Using O*NET, Dey, Frazis, Loewenstein, and Sun (2020) have applied the Dingel-Nieman framework to create a 0-1 variable indicating an occupation's suitability for telework. I refer to this indicator as teleworkable1. Third, Dalton, Dey, and Loewenstein (2023) use the Bureau of Labor Statistics' Business Response and

[8] A child may have attended some classes in person and some classes remotely, in which case remote schooling and in person schooling would both take on the value 1. Both indicator variables will also take on the value 1 if some children in the household attended solely remotely and others attended solely in person. The same comment applies to public, private, and home school.

[9] A detailed description an analysis of the task information can be found in Dey, Loewenstein, and Sun (2021). The task variables that I use in the current analysis are the same as the ones appearing Table 1 in Dey, Loewenstein, and Sun (2021), except I drop the math use variable.

Occupational Employment and Wage Surveys to estimate the proportion of workers in an occupation that teleworked in the summer of 2021. I call this variable teleworkable2.

I also bring in two additional pieces of information from other sources. Google cell-phone location data that provides information on visits to workplaces in the respondent's round 19 county of residence allows one to measure the change in county level activity at workplaces between a baseline period before the COVID-19 pandemic (January 3, 2020, to February 6, 2020) and the period of the supplement interview (February to May 2021).[10] Greater reductions in the activity at workplaces in the spring of 2021 were associated with increased COVID related restrictions and greater reluctance on the part of employees to head into the worksite. Consequently, the change in county level activity should be negatively correlated with teleworking.

Safe Graph cell phone data provides a measure of reduced school activity. In my analysis, I use a countywide measure of the percentage of "schools closed" that has been made available by Parolin and Lee (2021). [11] This measure counts a school as closed if calls from in the spring of 2021 have fallen by 50% or more from the pre-Covid period. Note that while there is reduced school activity at a school that is counted as "closed", there may still be some in-person learning taking place. I will therefore refer to this variable as the proportion of schools that are partially closed. Naturally, the greater the proportion of schools with at least partial closure, the greater the likelihood that a respondent's children attended school remotely.

[10] "See how your community moved differently due to COVID-19," *COVID-19 Community Mobility Reports* (Google), https://www.google.com/covid19/mobility/. The reports are not updated after 10/15/22.

[11] U.S. School Closure and Distance Learning Data Base. Contributors Zachary Parolin and Lee. https://osf.io/tpwqf/

III. Data Analysis

We're now ready to turn an analysis of the data. Not all jobs are equally suited for teleworking. Individuals in jobs better suited for teleworking would have been more able to telework in response to Covid restrictions and/or remote schooling by their children. As noted above, several available variables provide information on how suitable an individual's job is for teleworking. It will be helpful for the analysis that follows to combine these to form a single variable that summarizes a job's suitability for telework.

Obtaining a Single Variable to Measure a Job's Suitability for Telework

In order to obtain a single variable that captures a job's suitability for teleworking, I estimate the following equation for the non-schooling subsample:

(1) $T = b_1 X_1 + b_2 X_2 + e$,

where *T* is the 0-1 teleworking indicator, X_1 includes variables closely related to a job's suitability for teleworking, and X_2 includes the other variables in Table 1. An estimate of a job's suitability for teleworking is then given by

(2) $Teleworkable = \hat{b}_1 X_1$,

where, $\hat{b}_1$ is the estimated coefficient on b_1. Having obtained *Teleworkable* from an equation estimated over the non-schooling subsample, I then use it as an explanatory variable in equations estimated over the schooling subsample. X_1 includes *Teleworkable1*, *Teleworkable2*, and the various task measures. It also includes education and AFQT quartiles since these may also capture information about the types of jobs that individuals are in. Table 2 presents the correlations between *Teleworkable, Teleworkable1*, *Teleworkable2*, the various task measures, education, and AFQT scores. The correlations are as one

would expect. *Teleworkable* is positively correlated with *Teleworkable1*, *Teleworkable2*, task measures that indicate more skilled jobs, education and AFQT.

Ordinary Least Squares Teleworking Equation

With the variable *Teleworkable* in hand, we are now ready to estimate a teleworking equation across the schooling sample. Our starting point is the equation

(3) $T = a_1 Teleworkable + a_2 R + a_3 W + a_4 X + e$,

where *R* is a 0-1 remote schooling indicator, *W* is the county level change in workplace activity, and X is a vector of other explanatory variables that may affect the likelihood of teleworking. Variables pertaining to job characteristics are excluded from *X*. The effect of these variables is captured entirely through their effect on *Teleworkable*. Since education and AFQT score are individual characteristics, I include them in *X*, thereby allowing them to affect the likelihood of teleworking other than through their effect on *Teleworkable*. However, dropping education and AFQT has little effect on the estimates.

Column 1 of Table 3 shows the results of estimating (3) over the schooling subsample. Probit estimates are very similar.[12] As expected, the *Teleworkable* coefficient is large and statistically significant. The coefficient on the change in the county level activity at workplaces is negative and significant, indicating that greater reductions in the activity at workplaces in the spring of 2021 were associated with increased teleworking. The statistically significant positive coefficient on remote schooling provides support for the hypothesis that parents whose children attended school remotely

[12] I choose to present the OLS results for expositional and analytical convenience. In their Mostly Harmless Econometrics blog, Angrist and Peschke note that "there is a lot to be said for sticking to a linear regression function as compared to a fairly arbitrary choice of a non-linear one!" Others have found that the linear probability generally does a pretty good job of estimating marginal effects and yields estimates close to the probit, especially when the probability estimates are between 20 and 80 percent. Furthermore, IV estimation in which the first stage is probit yields inconsistent estimates when the endogenous dependent variable is binary.

were more likely to telework. Specifically, the coefficient estimate indicates that remote schooling was associated with an 9 percentage point increase in the likelihood of teleworking. This effect is quite sizeable given that that the mean teleworking probability is 37 percent. The estimates also indicate that parents with a child who did not attend school the week prior to the interview were less likely to telework.[13] .

It is important to note that not all parents were equally able to work at home when their children attended school remotely. Individuals in jobs more suitable for teleworking would have been better able to work at home in response to the demands on their time brought about by remote schooling. One would also expect the effect of the change in workplace activity to depend on how suitable an individual's job is for teleworking. For the sake of generality, I add interactions of *Teleworkable* with the other explanatory variables as well, so that the telework incidence equation becomes

(3') $T = a_1 Teleworlable + a_2 R + a_3 Teleworkable*R + a_4 W + a_5 Teleworkable*W$

$+ a_6 X + a_7 Teleworkable*X + e$,

Column 3 shows the results of estimating (3'). Evaluated at the median value of *Teleworkable*, remote schooling is associated with a statistically significant 9 percentage point increase in the likelihood of teleworking. At the 75th percentile, remote schooling is associated with a 13 percentage point increase in the likelihood of teleworking. In contrast, at the 10th percentile of *Teleworkable*, remote schooling is only associated with a statistically insignificant 3 percentage point increase in telework incidence.

[13] There are 59 observations in the sample where a child was enrolled in school but attended neither remotely nor in person in the week prior to the interview. I've designated these cases as instances where a child did not attend school. The estimated effect on telework incidence is quite large, but is estimated imprecisely due to the small number of observations.

Ordinary Least Squares Remote Schooling Equation

Parents who teleworked may have found remote schooling more manageable and therefore may have been more likely to choose remote schooling for their children when given the option. Alternatively, parents who teleworked may have found that remote schooling interfered with their work and therefore may have been less likely to choose remote schooling for their children when given the choice.[14] Another obvious variable affecting the likelihood that a child attends school remotely is the countywide school partial school closure rate. The remote schooling equation thus takes the form:

(4) $R = b_1 S + b_2 T + b_3 X + u,$

where S is the countywide measure of the proportion of schools which are at least partially closed and X denotes other variables that may affect whether or not a parent's child attends school remotely.

The first column in Table 4 shows the results of an estimation in which the remote school indicator is the dependent variable. As expected, the coefficient on the percentage of schools with reduced activity within the county is very large and highly significant. The coefficient on teleworking incidence is also positive and statistically significant.

Instrumental Variables Estimation

The finding that remote schooling has a positive coefficient in the telework equation and that telework incidence has a positive coefficient in the remote schooling equations means that at least one of these coefficients is biased upward. I address this issue by performing instrumental variable regressions for the telework and remote schooling equations.

[14] Actually, one could make a similar argument with respect to the teleworking decision. Parents concerned about children interfering with their work at home could conceivably forego teleworking when their children attend school remotely, but one would expect that a desire to provide needed help to their children would generally be the dominant factor.

Column 3 in Table 3 presents two stage least squares estimates of the teleworking equation (3). I instrument for remote schooling by the school closure variable *S*. The estimated remote schooling coefficient is a quite large 0.226. The coefficient is estimated imprecisely but is still statistically significant.

Column 4 in Table 3 presents the two stage least squares estimates of the alternative remote schooling equation (3') that allows the effect of the explanatory variables to depend on a job's suitability for teleworking. Note that the equation has two potentially endogenous variables, remote schooling *R* and remote schooling interacted with *Teleworkable*, *Teleworkable*R.* The first of these is instrumented with the school closure rate *S*. I instrument for the second simply by interacting *S* and *Teleworkable*. The estimated effect of remote schooling on teleworking is imprecise but is statistically different from zero at values of *Teleworkable* at the median and above. At the 10th percentile of Teleworkable, remote schooling is estimated to have no effect on the likelihood of telework.

Column 3 in Table 4 presents two stage least squares estimates of the remote schooling equation (5). The endogenous variable telework incidence *T* is instrumented by *Teleworkable*, activity at the workplace *W*, and interactions of *W* and all variables other than *S* with *Teleworkable*. The coefficient on the telework indicator is only 0.17 and is not statistically different from zero. The coefficient on telework is small and statistically insignificant.

Reduced Form Equations

We can gain further insight by looking at the reduced form estimates. Solving for the reduced form when the telework equation is (3) and the remote schooling equation is (4), we obtain

(5a) $T = \alpha_1 Teleworkable + \alpha_2 W + \alpha_3 S + \alpha_4 X + \varepsilon_1$

(5b) $R = \beta_1 Teleworkable + \beta_2 W + \beta_3 S + \beta_4 X + \varepsilon_2$.

The estimates of the reduced form teleworking equation (5a) can be found in column 5 of Table 3. The coefficient on school closures is positive and statistically different from zero. Other things the same, the likelihood of teleworking is 10 percentage points greater in a county in which all schools are partially closed than in a county where no schools are closed. The coefficients on *Teleworkable* and workplace activity *W a*re also right signed and statistically significant.

The estimated reduced form remote schooling equation appears in column 3 of Table 4. The coefficient on *Teleworkable* is approximately 0 and not statistically significant. The coefficient on activity at the workplace is also not statistically significant. In summary, the reduced form equations provide strong evidence that remote schooling leads to greater teleworking, but teleworking does not affect remote schooling.

I also estimate the reduced form when the teleworking equation is (3'). Solving equations (3') and (4) for teleworking incidence *T*, one obtains

(6a) $T = (1/(1-c_1 - c_2 Teleworkable))(\delta_1 Teleworkable + \delta_2 R + \delta_3 * W + \delta_4 S + \delta_5 Teleworkable * W + \delta_6 Teleworkable * S + \delta_7 Teleworkable * X + \varepsilon)$,

where $c_1 = a_2 * b_2$ and $c_2 = a_3 * b_2$ (see equations (3') and (4)) and ε is an error term. Note that *T* is a non-linear function of *Teleworkable*. However, the estimated value of c turns out to be 0, so that (6a) reduces to

(6a') $T = \delta_1 Teleworkable + \delta_2 R + \delta_3 * W + \delta_4 S + \delta_5 Teleworkable * W + \delta_6 Teleworkable * S + \delta_{\gamma\gamma 7} Teleworkable * X + \varepsilon$.

Also note that c1 = c2 = 0 implies that either the coefficient of remote schooling interacted with *Teleworkable* in the telework equation is 0 or the coefficient on telework incidence in the remote schooling equation is 0.

The coefficient estimates in (6a') are presented in column 1 of Table 5. The estimates are consistent with results that have been presented up to now. Note in particular that the impact of the school closure rate varies directly with *Teleworkable*, indicating that the effect of the school closure rate on the likelihood of teleworking is greater the more suitable is an individual's job for teleworking. This is consistent with our earlier findings that the effect of remote schooling on teleworking is greater when *Teleworkable* is larger.

The estimated remote schooling equation

(6b) $R = \gamma_1 Teleworkable + \gamma_2 R + \gamma_3 *W + \gamma_4 S + \gamma_5 Teleworkable*W$

$+ \gamma_6 Teleworkable*S + \gamma_7 Teleworkable*X + \varepsilon.$

is presented in the fourth column of Table 4. [15] As was true of the estimated equation (5b), the estimated equation (6b) provides compelling evidence that teleworking did not influence the likelihood of remote schooling. Not only is the coefficient on *Teleworkable* is small and statistically insignificant, but the estimated effect of school closures on remote schooling is smaller when a parent is in a job than is more suitable for teleworking than when they are in a job that is less suitable (although the estimate of the differential impact is not statistically significant).

In summary then, the estimated effect of remote schooling on the likelihood of teleworking is positive in both the OLS and IV teleworking equations, but the coefficients in the IV equations are much less precise than those in the OLS equation. Furthermore, the reduced form equations provide a strong indication that teleworking does not affect the likelihood of remote schooling, so that remote schooling can taken as exogenous in the teleworking equation. The preferred teleworking equations are therefore the OLS estimates in the first two columns of Table 3 while the preferred remote schooling equation is the two stage least squares estimation in column 2 of Table 4. My estimates indicate that on average remote schooling led to a 9 percentage point increase in teleworking. However, the effect of remote schooling depended crucially on how well suited an individual's job was to teleworking. In jobs that were not well suited, remote schooling had no effect on teleworking. In jobs that were well suited, the effect was quite large – the point estimate is that at the 75th percentile, remote schooling led to an 13 percentage point increase in teleworking.

[15] I have omitted the term $(1/(1-c_1-c_2 Teleworkable)$ from the equation. Attempts to estimate c_2 were unsuccessful. However, as discussed below, the other estimated coefficients strongly imply that teleworking does not affect remote schooling, so that $c_1=c_2 = 0$..

Male and Female Equations

I now estimate separate telework equations for males and females.[16] I only estimate OLS equations since the preceding estimates provide strong evidence that telework did not affect remote schooling.[17] The estimates are presented table 5. Comparing columns 1 and 2, one sees that when their child attends school remotes, females are more likely than males to telework. Specifically, the estimate in column 1 indicates that remote schooling leads to a 5.3 percentage point increase in the likelihood of teleworking by men and a 13.5 percentage increase in the likelihood of teleworking by women.[18] The t statistic on the difference in the remote schooling coefficients in the two equations is 1.9. Comparing columns 3 and 4, one sees that the differences in the male and female responses to remote schooling holds up for various values of *Teleworkable*. The difference is statistically significant at the 75th percentile of teleworkable.

Wage Equation

Workers in jobs suitable for teleworking earn substantially more than others, as indicated by the wage regression reported in table 6. The explanatory variables in the equation include the *Teleworkable* variable, along with AFTQT score, education, and other personal characteristics. The dependent variable is the log wage earned in the previous round 19 interview. The coefficient on *Teleworakable* is positive and quite large.

IV. Conclusion

The pandemic resulted in a very large increase in teleworking. In addition, school closings led to a large number of students attending school remotely. An NLSY97 COVID-19 pandemic supplement in the spring of 2021 makes it possible to examine the relationship between these two occurrences. Thirty-seven percent of parents whose children were enrolled in school worked at home 10 hours or more in the week prior to the time they were surveyed. Other things the same, remote schooling attendance by an individual's children resulted in a 9 percentage point increase in their likelihood of

[16] Yamamura and Tsutsui (2021) find that in Japan, women with children in primary school are more likely to work at home while men with children in primary school are less likely to work at home. As COVID cases increase and school closed, men and women were both more likely to work at home, but the impact on women was greater.
[17] In any case, the sample is not large enough to estimate separate male and female two stage least squares equations with any reasonable precision.
[18] In a similar vein, using data on women in the 1979 National Longitudinal Survey of Youth and on their children in the NLS Child and Young Adult Survey, Kouki finds that a temporary child health problem induces women to work at home. She also finds that this is associated with a wage penalty that she attributes as likely being due to women choosing or being assigned to less promotable jobs when working at home.

working at home. Not surprisingly, the responsiveness of teleworking to remote schooling depended crucially on how suitable an individual's job was to teleworking. In jobs that were very poorly suited to teleworking, remote schooling had no effect on the likelihood that an individual teleworked. But in jobs that were well suited, the effect on the likelihood of teleworking was as great as 13 percentage points. Furthermore, remote schooling had a substantially larger effect on the likelihood that women worked from home than the likelihood that men worked at home.[19]

While parents no longer need to contend with remote schooling, the flexibility allowed by jobs that are well suited for teleworking enables individuals in such jobs to better meet the demands of childcare and other household responsibilities. For example, parents with jobs that allow them to work at home may be able to telework on the days that their children cannot attend school when they are sick or when school is closed due to bad weather. This consideration may be more important for women, who still seem to bear the majority of household responsibilities, than men.

My analysis has focused on individuals who were working. It's possible that remote schooling by their children may cause some parents not to work at all. However, an analysis of the NLSY97 data shows little, if any, effect of remote schooling on the likelihood of working in the spring of 2021. [20]

Finally, the increased ability of workers in the right jobs to work at home is a source of increased inequality. Workers in these jobs earn substantially more. The earnings premium accorded to individuals in jobs with characteristics conducive to teleworking understates the benefits workers in these jobs enjoy because it leaves out the value they place on the flexibility afforded by being able to telework.

[19] As shown in Table 1, women were more likely than men to have teleworked.

[20] Heggenes and Suri find that in March 2021, non-college educated mothers in onsite jobs were less likely to be actively working as the result of the pandemic and the associated school closures, but the estimated effect is small. (Counterintuitively, college educated women in jobs that were compatible with teleworking were also less likely to be actively working.) Similarly, Aaranson and Alba (2021) find the school closures affected the labor force participation for men and women, but again the estimated effect is quite small.

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Table 1. Descriptive Statistics of Background Variables for People born in the years 1980 to 1984 from NLSY97 Round 19 and COVID-19 Supplement Interview

	Non-School Subsample	*Those with children in school**		
		All	Men	Women
Outcomes				
Telework at least 10 hours	0.394	0.366	0.327	0.402
Any in-person school		0.691	0.711	0.672
Any remote school		0.649	0.661	0.682
Schooling				
Did not attend schooling last week		0.021	0.022	0.022
Public		0.901	0.888	0.912
Private		0.124	0.147	0.103
Home Schooling		0.026	0.028	0.024
Other		0.014	0.016	0.013
Employment and Job Characteristics at Round 19 Interview				
If working at job 1 at Round 19 interview				
Military	0.014	0.015	0.022	0.008
Teleworkable1	0.451	0.453	0.407	0.494
Teleworkable2	0.188	0.165	0.155	0.175
Missing Teleworkable1	0.012	0.114	0.014	0.012
Missing Teleworkable2	0.037	0.192	0.056	0.023
At least half time on physical tasks	0.415	0.489	0.457	0.342
At least half time on repetitive tasks	0.376	0.491	0.378	0.430
At least half time managing or supervising	0.278	0.474	0.389	0.297

Solve problems of 30 minutes of more at least weekly	0.420	0.493	0.475	0.356
Typically read documents of 6 or more pages	0.252	0.435	0.267	0.239
Have a lot of face-to-face contact (excluding coworkers)	0.448	0.500	0.440	0.544
Missing task information	0.008	0.099	0.007	0.012
Not Working at Round 19 Interview	0.057	0.051	0.034	0.066
Demographics				
Female	0.383	0.522		
Non-black, non-Hispanic	0.724	0.727	0.725	0.729
Black, non-Hispanic	0.142	0.134	0.121	0.146
Hispanic	0.123	0.124	0.137	0.113
Other	0.010	0.014	0.016	0.013
Quartile of AFQT Score				
1st	0.178	0.178	0.178	0.178
2nd	0.178	0.206	0.187	0.222
3rd	0.214	0.238	0.229	0.247
Highest	0.318	0.251	0.257	0.246
Highest Degree Completed				
Less than high school	0.030	0.039	0.036	
GED	0.062	0.058	0.076	0.042
High school diploma	0.159	0.195	0.219	0.173
Some college	0.272	0.294	0.289	0.299
Bachelor's degree or higher	0.478	0.413	0.380	0.444
Household Composition				
Spouse/partner in household	0.602	0.817	0.911	0.731
Children less than age 18 in household				

No children	0.649	-0.307		
Children less than age 6	0.252	0.389	0.444	0.338
Children ages 6 to 17	0.099	0.919	0.905	0.931
Geography at Round 19 Interview				
Urban	0.829	0.749	0.741	0.757
Central region	0.220	0.260	0.265	0.255
Southern region	0.360	0.382	0.362	0.400
Western region	0.244	0.211	0.205	0.216
County-level activity at workplaces (percent change)	-28.39	-25.82	-25.957	-25.685
[Standard deviation]	8.85	8.29	8.145	8.420
County-level school closure variable	0.439	0.376	0.384	0.368
[Standard deviation]	0.258	0.255	0.250	8.420
Health at Round 19 Interview				
Health condition limits work	0.058	0.045	0.168	0.059
Sample Size	**1,729**	**923**		**1,266**

Note: Data are weighted.
*Children in k-12 and under age 18
Source: U.S. Bureau of Labor Statistics, National Longitudinal Survey of Youth 1997.

Table 2. Correlation Between Teleworkable Variable and Job Characteristics in Schooling Subsample

Variable	*Non-Schooling Subsample*	Schooling Subsample
Other Teleworkable Variables		
Teleworkable1	0.68	0.63
Teleworkable2	0.81	0.78
Task Variables		
Military	0.004	0.01
Spend At Least Half Time on Repetitive Tasks	-0.33	-0.31
Spend At Least Half Time on Physical Tasks	-0.77	-0.75
Spend At Least Half Time Managing or Supervising	-0.08	-0.08
Solve Problems of 30 or More Minutes At Least Weekly	0.27	0.26
Typically Read Documents of Six or More Pages	0.35	0.31
Have a Lot of Face-to-Face Contact (Excluding Coworkers)	-0.37	-0.35
Not Working at Round 19 Interview	0.009	0.02
Highest Degree Completed		
GED	-0.17	-0.13
High School Diploma	-0.22	-0.21
Some College	-0.11	-0.11
Bachelor's Degree or Higher	0.41	0.38
Quartile of AFQT Score		
2nd	-0.05	-0.11
3rd	0.06	0.06
Highest	0.27	0.28
Sample Size	1,729	2,189

Table 3. Coefficients Estimates and Standard Errors, Probability of Telework at Least 10 Hours in the Week prior to the NLSY97 Covid-19 Supplement Interview, February-May 2021

	OLS		***OLS[1]***		***IV***		***IV[1]***		***OLS***		***OLS[1]***	
	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error
Remote Schooling	0.092	0.021			0.226	0.110						
Teleworkable	1.098*	0.050	1.055*	0.051	1.099*	0.050	1.048*	0.055	1.097*	0.050	1.055*	0.051
County-level activity at workplaces (% change/10)	-0.075*	0.013			-0.060*	0.018			-0.066*	0.016		
County-level proportion of Schools that are partially closed									0.108*	0.052		
County-level activity at workplaces %change/10) at various percentiles of *Teleworkable*												
median value			-0.075*	0.014			-0.054*	0.020			-0.064*	0.016
75th percentile			-0.093*	0.017			-0.059*	0.003			-0.075*	0.021
Remote schooling at Various percentiles of *Teleworkable*												
10th percentile			0.031	0.028			-0.006	0.124				
median value			0.094	0.022			0.295	0.134				

75th percentile			0.128*	0.028			0.455*	0.200				
County-level proportion of Schools that are partially closed at various percentiles of *Teleworkable*												
10th percentile											0.006	0.066
median value											0.117*	0.053
75th percentile											0.173*	0.069
Schooling												
Did not attend school last week	0.154*	0.063	0.147	0.079	0.238*	0.090	-0.431	0.476	0.105	0.062	0.106	0.079
Public School	0.035	0.054	0.021	0.054	0.002	0.061	-0.061	0.074	0.061	0.054	0.054	0.054
Private School	0.014	0.047	0.005	0.047	0.028	0.048	0.004	0.048	0.006	0.048	0.002	0.047
Home School	0.001	0.059	-0.007	0.060	-0.014	0.059	-0.040	0.062	0.011	0.060	0.006	0.062
Other	0.090	0.068	0.110	0.064	0.072	0.069	0.068	0.066	0.099	0.069	0.121	0.072
Demographics												
Female	0.027	0.020	0.039	0.020	0.020	0.021	0.033	0.021	0.034	0.020	0.043*	0.020
Black, non-Hispanic	0.016	0.025	0.019	0.026	-0.004	0.030	0.001	0.031	0.022	0.022	0.017	0.027
Hispanic	0.003	0.028	0.007	0.030	-0.005	0.029	-0.001	0.031	0.003	0.003	0.002	0.030
Other	0.031	0.071	0.033	0.070	0.015	0.072	-0.007	0.074	0.041	0.041	0.053	0.072
Quartile of AFQT Score												
2nd	0.072*	0.028	0.076	0.036	0.070*	0.029	0.061	0.039	0.073*	0.028	0.081*	0.036
3rd	0.063	0.030	0.056	0.036	0.059	0.030	0.045	0.039	0.063	0.029	0.057	0.036
Highest	0.067	0.034	0.065	0.040	0.060	0.035	0.050	0.043	0.071	0.034	0.069	0.040

Highest Degree Completed												
GED	0.019	0.058	0.068	0.075	0.028	0.060	0.096	0.079	0.011	0.058	0.051	0.074
High school diploma	0.047	0.050	0.157	0.063	0.056	0.052	0.163	0.064	0.038	0.049	0.157	0.063
Some college	0.034	0.049	0.163*	0.061	0.039	0.050	0.161	0.062	0.030	0.048	0.167	0.061
Bachelor's degree or higher	0.140*	0.052	0.252*	0.062	0.154*	0.054	0.265*	0.064	0.128*	0.052	0.248*	0.062
Household Composition												
Spouse/partner in household	0.013	0.024	0.007	0.025	0.015	0.024	0.012	0.026	0.012	0.024	0.007	0.026
Children less than age 6 in household	0.013	0.021	0.020	0.021	0.018	0.210	0.035	0.023	0.009	0.021	0.012	0.021
Children ages 6 to 17 in household	0.043	0.038	-0.028	0.038	-0.063	0.043	-0.048	0.045	-0.029	0.038	-0.020	0.038
Geography at Round 19 Interview												
Urban	0.016	0.024	0.025	0.026	0.007	0.026	0.009	0.029	0.019	0.024	0.029	0.026
Central region	0.039	0.030	0.040	0.030	0.059	0.034	0.062	0.035	0.035	0.031	0.036	0.030
South region	0.020	0.029	0.021	0.029	0.043	0.034	0.045	0.035	0.015	0.029	0.015	0.029
West region	0.022	0.032	0.028	0.032	0.028	0.032	0.030	0.033	0.012	0.032	0.019	0.032
Health at Round 19 Interview												
Health condition limits work	0.049	0.028	0.070	0.048	0.051	0.048	0.072	0.050	0.047	0.049	0.072	0.049
	OLS		**OLS***		**IV**		**IV***		**OLS**		**OLS***	

R squared	0.333	0.353	0.32	0.310	0.328	0.347
Sample Size	**2,189**	**2,189**	**2,189**	**2,189**	**2,189**	**2,189**

Note: Data are weighted. Specifications include a control for mode of interview and dummy variables indicating missing values for AFQT score, highest grade completed, and urbanicity.

[1]Teleworkable estimate is evaluated at the means of the other explanatory variables. The remaining estimates are evaluated at the median value of Teleworkable unless indicated otherwise.

Source: U.S. Bureau of Labor Statistics, National Longitudinal Survey of Youth 1997.

Table 4. OLS Coefficients Estimates and Standard Errors, Probability of Remote Schooling in the Week prior to the NLSY97 Covid-19 Supplement Interview, February-May 2021

	OLS		IV		OLS		OLS[1]	
	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error
Telework Incidence	0.080*	0.022	0.022	0.047				
County-level proportion of Schools that are partially closed	0.535*	0.043	0.553*	0.044	0.479*	0.055		
County-level activity at workplaces (% change/10)					-0.027	0.018		
Teleworkable					-0.008	0.058	-0.031	0.059
County-level activity at workplaces (% change) at various percentiles of Teleworkable								
median value							-0.029	0.018
75th percentile							-0.034	0.023
County-level proportion of Schools that are partially closed at various percentiles of Teleworkable								
10th percentile							0.582*	0.083
median value							0.473*	0.055
75th percentile							0.416*	0.070
Schooling								
Did not attend school last week	-0.592*	0.040	-0.587*	0.041	-0.586*	0.041	-0.546*	0.052
Public School	0.261*	0.058	0.263	0.058	0.263	0.059	0.256	0.056
Private School	-0.095	0.051	-0.095	0.051	-0.097	0.052	-0.097	0.050
Home School	0.112	0.059	0.111	0.059	0.110	0.059	0.130	0.062
Other	0.114	0.070	0.115	0.071	0.117	0.071	0.115	0.075
Demographics								
Female`	0.051*	0.021	0.059*	0.021	0.061*	0.021	0.061*	0.021

Black, non-Hispanic	0.093*	0.029	0.116*	0.028	0.117*	0.028	0.090*	0.030
Hispanic	0.017	0.027	0.038	0.026	0.036	0.026	0.022	0.028
Other	0.125	0.073	0.113	0.074	0.114	0.073	0.126	0.069
Quartile of AFQT Score								
2nd	0.024	0.034	0.012	0.033	0.013	0.033	0.037	0.038
3rd	0.027	0.036	0.016	0.035	0.020	0.035	0.037	0.038
Highest	0.055	0.037	0.047	0.037	0.050	0.037	0.058	0.040
Highest Degree Completed								
GED	-0.094	0.063	0.077	0.060	-0.075	0.060	-0.111	0.074
High school diploma	-0.084	0.052	0.081	0.049	-0.077	0.049	-0.057	0.058
Some college	-0.044	0.050	0.039	0.048	-0.037	0.047	-0.017	0.055
Bachelor's degree or higher	-0.139*	0.052	0.123*	0.051	-0.118	0.050	-0.099	0.056
Household Composition								
Spouse/partner in household	-0.019	0.026	-0.015	0.025	-0.014	0.025	-0.014	0.026
Children less than age 6 in household	-0.037	0.023	-0.039	0.022	-0.039	0.023	-0.043	0.023
Children ages 6 to 17 in household	0.184*	0.041	0.150*	0.041	0.151*	0.041	0.154*	0.041
Geography at Round 19 Interview								
Urban	0.060*	0.027	0.060*	0.027	0.053	0.027	0.054	0.028
Central region	-0.113*	0.034	-0.111*	0.034	-0.104*	0.034	-0.105*	0.034
South region	-0.135*	0.030	-0.124*	0.030	-0.123*	0.030	-0.125	0.030
West region	-0.072	0.032	0.071	0.031	-0.068	0.032	-0.067	0.032
Health at Round 19 Interview								
Health condition limits work	-0.023	0.048	-0.021	0.047	-0.017	0.047	-0.015	0.045
R squared		0.249		0.245		0.244		0.258
Sample Size		2,189		2,189		2,189		2,189

Note: Data are weighted. Specifications include a control for mode of interview and dummy variables indicating missing values for AFQT score, highest grade completed, and urbanicity.

[1]Teleworkable estimate is evaluated at the means of the other explanatory variables. The remaining estimates are evaluated at the median value of Teleworkable unless indicated otherwise.

Source: U.S. Bureau of Labor Statistics, National Longitudinal Survey of Youth 1997.

Table 5. Coefficients Estimates and Standard Errors, Probability of Telework at Least 10 Hours in the Week prior to the NLSY97 Covid-19 Supplement Interview, February-May 2021

	OLS Male		OLS Female		OLS Male[1]		OLS Female[1]	
	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error	Coeff. Estimate	Robust Std. Error
Remote Schooling	0.053	0.030	0.135*	0.031				
Teleworkable	1.097	0.079	1.106	0.066	1.009	0.088	1.068	0.072
County-level activity at workplaces (% change/10)	-0.069	0.021	-0.077	0.018				
County-level activity at workplaces (% change/10) at various percentiles of *Telework able*								
median value					-0.077*	0.022	-0.007*	0.002
75th percentile					-0.107*	0.031	-0.008*	0.020
Remote schooling at various percentiles of *Teleworkable*								
10th percentile					-0.004	0.038	0.080	0.045
median value					0.056	0.032	0.133*	0.031
75th percentile					0.088*	0.042	0.161*	0.040
Schooling								
Did not attend school last week	0.187	0.106	0.136	0.070	0.176	0.153	0.139	0.082
Public School	0.032	0.069	0.019	0.093	0.020	0.071	0.035	0.093
Private School	0.037	0.055	-0.031	0.088	0.034	0.058	-0.018	0.089
Home School	-0.049	0.082	0.057	0.085	-0.067	0.092	0.221	0.085
Other	-0.009	0.102	0.193*	0.083	-0.027	0.147	0.221*	0.085
Demographics								
Female								
Black, non-Hispanic	-0.014	0.037	0.030	0.033	-0.016	0.044	0.028	0.035
Hispanic	0.009	0.043	-0.006	0.038	0.019	0.048	-0.002	0.038

Other	0.021	0.099	0.044	0.107	-0.023	0.094	0.112	0.120
Quartile of AFQT Score								
2nd	0.034	0.041	0.106*	0.040	0.056	0.065	0.101*	0.046
3rd	0.026	0.042	0.099*	0.042	0.014	0.063	0.101*	0.046
Highest	0.038	0.049	0.098*	0.048	0.027	0.068	0.102	0.053
Highest Degree Completed								
GED	0.005	0.079	0.029	0.085	0.094	0.114	0.046	0.095
High school diploma	0.019	0.071	0.050	0.067	0.140	0.094	0.140	0.079
Some college	-0.018	0.070	0.070	0.066	0.171	0.087	0.148	0.078
Bachelor's degree or higher	0.100	0.075	0.167*	0.070	0.272*	0.088	0.242*	0.080
Household Composition								
Spouse/partner in household	0.013	0.046	0.016	0.029	0.009	0.061	0.017	0.030
Children less than age 6 in household	0.004	0.030	0.013	0.029	0.011	0.032	0.011	0.029
Children ages 6 to 17 in household	0.033	0.053	-0.061	0.056	-0.015	0.053	-0.066	0.058
Geography at Round 19 Interview								
Urban	-0.029	0.035	0.060	0.034	-0.014	0.039	0.058	0.035
Central region	0.050	0.043	0.023	0.043	0.051	0.044	0.024	0.043
South region	0.038	0.042	0.004	0.040	0.032	0.043	0.008	0.040
West region	0.081	0.046	-0.028	0.045	0.084	0.048	-0.019	0.045
Health at Round 19 Interview								
Health condition limits work	0.096	0.090	0.025	0.055	0.099	0.093	0.048	0.056
R squared	0.351		0.328		0.382		0.347	
Sample Size	923		1,266		923		1266	

Note: Data are weighted. Specifications include a control for mode of interview and dummy variables indicating missing values for AFQT score, highest grade completed, and urbanicity.

[1]Teleworkable estimate is evaluated at the means of the other explanatory variables. The remaining estimates are evaluated at the median value of Teleworkable unless indicated otherwise.

Source: U.S. Bureau of Labor Statistics, National Longitudinal Survey of Youth 1997.

Table 6. Coefficients Estimates and Standard Errors, Log Wage in Previous Round 19 Interview

	OLS	
	Coeff. Estimate	Robust Std. Error
Teleworkable	0.627*	0.094
Demographics		
Female	-0.102*	0.032
Black, non-Hispanic	-0.036	0.047
Hispanic	-0.016	0.045
Other	-0.302	0.205
Quartile of AFQT Score		
2nd	0.014	0.058
3rd	0.073	0.063
Highest	0.135*	0.063
Highest Degree Completed		
GED	-0.010	0.100
High school diploma	0.063	0.070
Some college	0.138	0.070
Bachelor's degree or higher	0.433*	0.073
Household Composition		
Spouse/partner in household	0.087*	0.034
Children less than age 6 in household	0.194*	0.036
Children ages 6 to 17 in household	0.043	0.052
Geography at Round 19 Interview		
Urban	-0.028	0.050
Central region	-0.065	0.045
South region	-0.103*	0.043
West region	0.133*	0.059
Health at Round 19 Interview		
Health condition limits work	-0.143	-0.143
R squared	**0.278**	

Sample Size	**1,632**

Note: Data are weighted. Specifications include a control for mode of interview and dummy variables indicating missing values for AFQT score, highest grade completed, and urbanicity.

Source: U.S. Bureau of Labor Statistics, National Longitudinal Survey of Youth 1997.