Household-Level Impacts of COVID-19 With and Without Children Present

Courtney Bir[1], Nicole Olynk Widmar[2], Jeffrey Young[3]

[1] Oklahoma State University
Dept. of Agricultural Economics
529 Ag Hall
Stillwater, OK 74078
USA
405-744-9813
ORCID: 0000-0003-0862-8241
courtney.bir@okstate.edu

[2] Purdue University
Dept. of Agricultural Economics
403 West State Street
West Lafayette, IN 47907
USA
765-494-2567
ORCID: 0000-0002-6574-5295
nwidmar@purdue.edu

[3] Murray State University
Dept. of Agricultural Science (Agribusiness)
213 South Oakley Applied Science
Murray, Kentucky 42071
USA
270-809-4329
jyoung6@murraystate.edu

* Corresponding author
Email: courtney.bir@okstate.edu

Competing interests: The authors have no competing interests.

COVID-19 Era Impacts on Households with Children

Abstract

Households with children faced unique challenges from COVID-19 adjustments, including balancing economic factors alongside the concurrent loss of support systems and increase in caregiver requirements (i.e. providing schooling). A nationally representative sample of 1,198 U.S. residents were surveyed between June 12th and 20th 2020, of which 347 respondents reported having children under 18 in their household. In households with children, 20% reported they were unable to access their usual childcare, 53% had to take on schooling activities, and 28% were not able work or had to cut back on hours due to childcare responsibilities. For all five household activities studied, mean impact was higher for households with children than those without. We modeled self-reported ability to find meat, milk and perishable grocery items and found that having a child increased the impact score by 0.360 and being female increased the score by 0.273. There was an increased probability the respondent took on schooling activities for their child if they were female, supporting concerns specific to female caregiver's employment and economic consequences in light of changes in response to COVID-19.

Introduction

As schools closed in response to the rapidly spreading COVID-19 virus, many parents and caretakers grappled with balancing caregiving and schooling activities alongside maintenance of employment and financial stability. Changes to daily routine and loss of support systems added a layer of complexity to caretaking activities (McLean, 2020). In addition to balancing economic and caregiving responsibilities the physiological impacts of caretaking for individuals unable to care for themselves compounded the emotional tolls for many people. Media attention on physical health outcomes, mental and emotional wellbeing (Panchal et al., 2020), economic

consequences (The Economist, 2020; The World Bank, 2020), and societal challenges resulting from the COVID-19 pandemic are plentiful. Many families are facing economic stresses of employment changes compounded with increased caretaker duties managing home care without social or structural support networks.

Societal challenges emerged quickly when critical employees, such as medical professionals, were forced to balance childcare and family needs alongside health-care work (Viner et al., 2020). In some regions of the U.S., parents who are dependent on school and childcare to be able to work supply as much as 29% of the workforce, making their re-entry into the workforce important for post-COVID-19 economic recovery (Bateman, 2020). As fall approached, national news media covered the struggles between professional lives and caring for children who may be out of school entirely, intermittently, or while schedules still unknown just days or weeks prior to anticipated reopenings (Beer, 2020). A survey conducted of 1,000 working parents of children under 15, found 73% of respondents reported major changes at work if schools do not reopen, including schedule amendments (44%), looking for an alternate job (21%), or even leaving the workforce entirely (15%) (Paisner, 2020).

There has been widespread public interest on household's survival and functionality during pandemic-related shutdowns. This analysis seeks to contribute to the understanding of COVID-19's impacts on U.S. households, with particular interest in impacts on households with children (versus those without children). It is hypothesized that households with children experienced unique impacts of COVID-19 adjustments. The significance of personal demographics, household demographics, and beliefs about mask-wearing to lessen risk of disease spread are explored with respect to understanding self-stated impacts on childcare/schooling and other household activities. Greater understanding of pandemic-era

87 impacts in households with children may facilitate future resource allocation decisions.
88 Disproportionate impacts of the pandemic on women, individuals working in certain industries,
89 and/or caretakers are increasing concerns worthy of further analyses.
90
91 **Methods**
92 Data collection took place during the beginning of the relaxation of social distancing in the U.S.,
93 from June 12, 2020 to June 20, 2020. A total of 1,198 completed responses were obtained; of
94 them, 347 reported having children in the household while 851 reported no children under the
95 age of 18 resided in their household at the time of data collection. The company Kantar, which
96 hosts a large opt-in panel database (Kantar, 2020), was used to obtain survey respondents. All
97 survey respondents were required to be 18 years of age or older to participate. The research
98 process was approved by Oklahoma State University IRB (number: 20-283). Quotas were set
99 within Qualtrics, an online survey tool (Qualtrics, 2020), to target the proportion of respondents
100 to match the U.S. census proportions for sex, age, education, income, and U.S. region of
101 residence (U.S. Census, 2016). This analysis focuses on potential differences in the impact of
102 COVID-19 on daily life and beliefs surrounding the use of face masks between those who
103 indicated they had children in their household and those that did not. The test of proportions was
104 employed to evaluate demographic differences between the two groups of respondents.
105 A test of the difference of two proportions $\widehat{p_1}$ and $\widehat{p_2}$, can be calculated as:

106 $$z = \frac{\widehat{p_1} - \widehat{p_2}}{\sqrt{\widehat{p_p}\left(1-\widehat{p_p}\right)\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} \quad (1)$$

107 given:

108 $$\widehat{P_p} = \frac{x_1+x_2}{n_1+n_2} \quad (2)$$

where x_1 and x_2 are the total number of successes in the two populations (Acock, 2018). The tests of proportion were conducted using STATA/SE16 (StataCorp, 2019).

Individual states in the U.S. have not experienced the same level of COVID-19 case level and potential impact. Therefore, states were grouped by three different criteria at the time of data collection to coincide with the state-specific situation being faced by respondents at the time that they took the survey: (1) number of cases over 40,001, (2) the top 10 states as defined by COVID-19 cases per capita, and (3) the top 6 states that experienced a rapid increase in COVID-19 cases after the 2020 U.S. Memorial Day holiday. As of June 17th 2020, 17 states had over 40,001 cases of COVID-19: California, Connecticut, Florida, Georgia, Illinois, Indiana, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, and Virginia (CDC, 2020a). In order to facilitate sound comparisons across states with varying population sizes, the number of COVID-19 cases as of June 17, 2020, was divided by the estimated 2019 population according to the U.S. census to generate a per-capita adjusted number of COVID-19 cases (U.S. Census Bureau, 2016). The top 10 states with the highest number of COVID-19 cases per-capita were Connecticut, Delaware, District of Colombia, Illinois, Louisiana, Maryland, Massachusetts, New Jersey, and Rhode Island. In response to reopening plans and post-memorial weekend, six states had record numbers of new cases including Arizona, Florida, Nevada, Oklahoma, Oregon, and Texas (CBS News, 2020).

In addition to demographics, respondents were asked to indicate on a scale from 1 (strongly disagree) to 5 (strongly agree) their level of agreement for the statements: *Someone in my household, or that I frequently spend time with is at higher risk of complications of COVID-19* and *I am in the higher risk group for complications of COVID-19*. The mean of the responses for those who indicated they had children in the household and those that did not were

calculated. A t-test was completed to compare between those who indicated they had children in the household and those that did not using STATA/SE16 (StataCorp, 2019). The test for μ_x (sample x) $=\mu_y$ (sample y) for unknown σ_x (standard deviation) and σ_y and $\sigma_x \neq \sigma_y$ is (Gosset, 1908):

$$t = \frac{(\bar{x} - \bar{y})}{\left(\frac{s_x^2}{n_x} + \frac{s_y^2}{n_y}\right)^{\frac{1}{2}}} \quad (3)$$

where $\bar{x}$ is the mean of sample x, $\bar{y}$ is the mean for sample y, s is the standard deviation and n is the sample size. The result of Equation 3 has a Student's t distribution with v degrees of freedom given by (Welch, 1947):

$$-2 + \frac{\left(\frac{s_x^2}{n_x} + \frac{s_y^2}{n_y}\right)^2}{\frac{\left(\frac{s_x^2}{n_x}\right)^2}{n_x+1} + \frac{\left(\frac{s_y^2}{n_y}\right)^2}{n_y+1}}. \quad (4)$$

To gauge beliefs surrounding mask wearing, respondents were asked to indicate their belief in a variety of mask related questions. Statements included: *yes masks have some potential role in U.S. society related to the spread of viral disease including COVID-19*, *wearing a mask helps prevent the spread of COVID-19*, *wearing a mask helps prevent me from getting COVID-19*, *wearing a mask helps prevent me from spreading COVID-19*, *wearing a mask will help prevent future lock-downs in my community related to COVID-19*, *there is social pressure in my community to wear a mask*, *wearing a mask does not prevent the spread of COVID-19*, and *wearing a mask has negative health consequences for the mask wearer*. The test of proportions (Equations 1 and 2) was used to statistically compare the percentage of respondents with children in their household and those without who believed in the statements.

Respondents were asked to indicate on a scale from 1 (not impacted) to 5 (impacted) the level of impact they experienced due to COVID-19 for 5 different areas of daily life.

Respondents also had the option to select *does not apply to me*. The activities included: *daily activities outside of work/school*, *ability to buy paper products (e.g., toilet paper, paper towels)*, *ability to find meat, milk, and perishable grocery items*, *ability to execute travel plans*, and *activities related to respondent's work/school*. The percentof respondents who selected each option was determined for those who indicated having children in the household and those that did not. After removing the respondents who indicated that particular activity did not apply to them, the mean of the responses was calculated. A t-test was used to statistically compare the mean impact level for those who indicated having children in the household and those who did not for each activity.

A series of ordinary least square (OLS) regressions were employed using STATA/SE16 (StataCorp, 2019) to evaluate the relationship between demographics, mask-related beliefs, and the impact level respondents felt from COVID-19 in their daily activities. Correlated error terms for the equations are likely suggesting a seemingly unrelated regression would be appropriate; however the independent variables did not differ therefore seemingly unrelated regression collapses to ordinary least squares (Greene, 2003). Given impact level L activity i and respondent n the equation can be given as:

$$L_{in} = \beta_1 Kids_{in} + \beta_2 Female_{in} + \beta_3 Age_{in} + \beta_4 Income_{in} + \beta_5 HighCase_{in} + \beta_6 HighCap_{in} + \beta_7 HighIncrease_{in} + \beta_8 YesMasks_{in} + \varepsilon_{in} \quad (5)$$

where $Kids_{in}$ is a dummy variable indicating whether the respondent reported children in the household, $Female_{in}$ is a dummy variable indicating whether the respondent selected female or male, Age_{in} is a continuous variable ranging from 1 (age 18-24) to 6 (65+), $Income_{in}$ is a continuous variable ranging from 1 (income of \$0-\$24,999) to 5 (income of \$100,000 or greater), $HighCase_{in}$ is a dummy variable indicating the respondents reported residence in a state with

greater than 401,000 cases of COVID-19, $HighCap_{in}$ is a dummy variable indicating the respondents reported residence in a state with a high per-capita number of COVID-19 cases, $HighIncresase_{in}$ is a dummy variable that indicates the respondents reported residence in a state that experienced a spike in COVID-19 cases post memorial day 2020, and $YesMasks_{in}$ indicates the respondent believed masks had a role in U.S. society related to the spread of COVID-19. The error term is represented by ε_{in}.

Respondents who reported there was a child in the household were asked about whether four additional statements occurred in their household as a result of COVID-19. The statements were: *my child was no longer able to attend daycare, stay with a family member etc. for childcare*, *I had to take on schooling activities for my child*, *I was not able to continue working or had to cut back on work hours due to childcare responsibilities*, and *my childcare and educational routine did not change due to COVID-19*. A multivariate probit (Cappellari and Jenkins, 2003) was employed to estimate the relationship between these statements (which took on the value of 1 if it occurred, and 0 otherwise) and demographics. The individual models were also estimated independently in order to obtain marginal effects, since the estimated marginal effects for each outcome are independent of the correlation structure itself (Mullahy, 2017). Given child related occurrence *j*, where *j* is equal to an affirmative response to one of the following occurrences: *my child was no longer able to attend daycare, stay with a family member etc. for childcare*, *I had to take on schooling activities for my child*, or *my childcare and educational routine did not change due to COVID-19,* the dependent variable *Y* (yes it occurred) can be estimated as:

$$Y_{jn} = \beta_1 Female_{jn} + \beta_2 Age_{jn} + \beta_3 Income_{jn} + \beta_4 ImpactOutsideWork_{jn} + \alpha_{jn}. \quad (6)$$

198 $Female_{jn}$ is a dummy variable indicating whether the respondent self-reported as female, Age_{jn} is
199 a continuous variable ranging from 1 (age 18-24) to 6 (65+), $Income_{jn}$ is a continuous variable
200 ranging from 1 (income of $0-$24,999) to 5 (income of $100,000 or greater),
201 $ImpactOutsideWork_{jn}$ is the level of impact from 1 (not impacted) to 5 (impacted) that COVID-
202 19 had on the respondent's daily activities outside of work. For the occasion *I was not able to*
203 *continue working or had to cut back on work hours due to childcare responsibilities* dependent
204 variable *Y* (yes it occurred) can be estimated as:

205 $$Y_n = \beta_1 Female_n + \beta_2 Age_n + \beta_3 Income_n + \beta_4 ImpactWork_n + \alpha_n. \quad (7)$$

206 Where all variables are as defined in equation 6 and $ImpactWork_n$ is the level of impact, on a
207 scale from 1 (not impacted) to 5 (impacted), COVID-19 had on daily activities related to the
208 respondent's work/school.
209
210 **Results**
211 Demographics of respondents who indicated there were children in the household differed
212 statistically from those who did not for several categories (Table 1). Fifty-eight percent of
213 respondents from the households with children were female and respondents most often
214 reporting children in the household were between 25 and 54 years of age. A higher percentage of
215 respondents with children in the household reported over $100,000 in annual household income
216 (28%) when compared to those who did not report children in the household and an income over
217 $100,000 annually (16%). A lower percentage of respondents with children in the household
218 reported having a Bachelor's degree (27%) when compared to those who did not have children
219 and reported a Bachelor's degree (33%). For the statement *I am in the higher risk group for*

220 *complications of COVID-19*, respondents with children had a lower self-reported risk (2.571)
221 when compared to those without children (2.976).
222 In response to the statement *masks have some potential role in U.S. society related to the*
223 *spread of viral disease including COVID-19*, there was not a statistical difference between the
224 percentage of respondents who selected yes and had children (82%) and those that did not have
225 children (84%) (Table 2). A lower percentage of respondents with children, when compared to
226 those without children, agreed with the statements *wearing a mask helps prevent the spread of*
227 *COVID-19*, and *prevents me from spreading COVID-19*. Additionally, a lower percentage of
228 respondents with children agreed with the statement *wearing a mask will help prevent future*
229 *lock-downs in my community related to COVID-19* (41%) when compared to those without
230 children (50%). A higher percentage of respondents with children (17%) agreed with the
231 statement *wearing a mask has negative health consequences for the mask wearer* when
232 compared to those without children (11%).
233 For all household activities studied, the mean score on a scale from 1 (not impacted) to 5
234 (impacted) was statistically higher for those with children in the household when compared to
235 those without (Table 3). For both groups of respondents, with and without children, *the ability to*
236 *find meat, milk and perishable grocery items* had the lowest mean impact score. Considering the
237 OLS equation of the impact score for respondents' daily activities outside of work/school, having
238 a child increased that impact score by 0.375 (Table 4). Selecting female and believing masks
239 have a role in society to prevent the spread of COVID-19 increased scores by 0.350 and 0.532,
240 respectively. As age increased, the impact score decreased. Conversely, as income increased the
241 score increased for respondents' daily activities outside of work/school. For the model of ability
242 to buy paper products, having a child increased the impact score by 0.272, being female

243 increased the score by 0.284, and believing masks have a role increased the score by 0.455. For
244 the model of ability to find meat, milk and perishable grocery items, having a child increased the
245 impact score by 0.360, being female increased the score by 0.273, and believing masks have a
246 role increased the score by 0.335. Again, the score decreased as age increased. For the model of
247 ability to execute travel plans, the impact score increased as income increased, and increased for
248 those who believed masks have a role in society. For the model of activities related to the
249 respondent's work/school, having children (0.474), being female (0.235), being in a state with a
250 high number of cases (0.308), and believing masks had a role (0.484) all increased the impact
251 score. The impact score also increased with income, and decreased with age.

252 Twenty percent of respondents with children (n=347) indicated their child was no longer
253 able to access childcare. Additionally, 53% of respondents with children had to take on schooling
254 activities for their child and 28% were not able to continue working, or had to cut back on hours
255 due to childcare responsibilities. Finally, 21% of respondents with children indicated their
256 childcare and educational routine did not change due to COVID-19. More women than men
257 reported having taken on schooling activities for children, although both sexes reported impacts
258 on loss of childcare and schooling for their children

259 Considering the probit model of *my child was no longer able to attend daycare, stay with*
260 *family member etc. for childcare*, the probability of selecting yes decreased with age (-0.044).
261 Conversely, the probability of saying yes increased with income (0.038). Selecting female
262 (0.123) increased the probability the respondent took on schooling activities for their child.
263 Additionally, the probability of taking on schooling activities for their child increased as age
264 increased (0.113) and increased as the impact from COVID-19 on daily activities outside of
265 work increased (0.055). The probability the person selected their childcare and educational

routine did not change due to COVID-19 decreased with the impact score COVID-19 had on activities related to their work/school.

Discussion

The differing demographics between households with and without children were expected due to the demographics/household characteristics typical of families with children at home. Data from the 2019 Current Population Survey (U.S. Census Bureau, 2019) indicate over half the women in the US with a child under the age of 18 are younger than 40 years old.

Understanding people's self-perceived risk level for complications or severe illness if they contract COVID-19 may help explain individual's behaviors. According to the CDC, people who are at high risk for COVID-19 are those with underlying medical conditions (CDC, 2020b,d) and older adults (especially those 85 years of age or older (CDC, 2020c). The CDC also lists 12 additional medical conditions which *might* put people at increased risk for severe illness, including asthma, cystic fibrosis, pregnancy, and high blood pressure (CDC, 2020d). The mean level of agreement the respondent was at high risk for COVID-19 complications was statistically lower in households with children which may be partially explained by younger age(s) of household members. While respondents with children reported less agreement they were at high risk themselves, the mean response was statistically equivalent for households with and without children in response to the statement "someone in my household, or that I frequently spend time with, is at higher risk of complications of COVID-19." Thus, even if the respondent felt less at risk, the likelihood of interacting with high risk individuals is not lessened in households with children. This fuels concern about in-person schooling in the sense that while the children or parents themselves may be at relatively lower risk than others, their networks risk

exposure of high risk individuals. Even as schools began to open in some regions of the U.S., the country remained divided about schools reopening, citing questions about the risk to children themselves, transmission to/from adults, and a variety of other factors (Tingley, 2020).

At the time of data collection, in June 2020, there was less agreement in households with children that wearing a mask helps prevent the spread of COVID-19, helps prevent the wearer from spreading the disease, and helps prevent future community lockdowns related to COVID-19. Lesser agreement in households with children that mask wearing may prevent future lockdowns is puzzling, although possible explanations, include pessimism associated with school opening plans and/or lengthened time without childcare options. Perhaps part of the lack of agreement that masks can aid societal outcomes is related to the consequences faced by parents during the ongoing pandemic. Past literature has explored a variety of aspects of workplace versus home stresses faced by caregivers, ranging from the overemphasis of workplace stress and largely ignored stresses of home, especially for women (Baruch, et al., 1987), to the application of workplace stress management practices for home caregivers (Winefield, 2000).

Statistically equivalent proportions of respondents with and without kids in the household felt there was social pressure to wear masks (33% and 30%) and reported wearing a mask does not prevent the spread of COVID-19 (16% and 13%) in June 2020. Very few negative health consequences for the mask wearer have been reported by medical professionals (Marfin, 2020) but the higher proportion (17% versus 11%) of respondents from households with children reporting negative health outcomes could be arising due to concerns about masks on very young children, under 2 years of age, or those who are unable to remove a mask without assistance, for whom masks are not recommended by the CDC (CDC, 2020e).

311 Higher self-reported impacts for all activities studied by households with children relative
312 to those without suggests heightened stress in households with kids during the pandemic. The
313 Household Pulse Survey by the U.S. Census Bureau revealed in an early results release that
314 "55% of households with a child under the age of 18 had at least one adult lose employment
315 income since the start of the COVID-19 pandemic, higher than the rate for all households"
316 (Monte, 2020). While ability to find perishable grocery items, like meat and milk, was rated the
317 lowest mean level of impact in the dataset as a whole, it is notable that impact was higher for
318 those households with children present. Monte (2020) found adults living with children were
319 more likely to report sometimes not having enough to eat, and were less confident in their ability
320 to pay their rent or mortgage in June 2020, than those living without children.
321 Activities outside of work/school and travel are highly correlated with household income
322 and other demographics. Older respondents may have different shopping behaviors with respect
323 to stocking pantries and shopping for essentials, for a variety of reasons ranging from intentional
324 reduction in numbers of trips into public in response to COVID-19 (Miller, 2020) to
325 tastes/preferences or shopping behaviors formed prior to 2020. Higher income households may
326 have the ability to fund large quantity purchases at bulk retailers, which may be out of reach for
327 households with less ability to buy ahead. Constrained cash flow necessitates smaller scale
328 purchases and thus a higher probability of difficulty finding items during peak demand periods.
329 Regardless, the presence of children was statistically significant in explaining higher reported
330 impacts for the diverse set of statements investigated in multivariate analysis.
331 Over half of respondents with children had to take on schooling activities for their child
332 and twenty percent were impacted by loss of daycare or family childcare. Twenty-eight percent
333 of respondents had to reduce working hours or stop entirely due to childcare responsibilities. The

probability of a child no longer being able to attend daycare or stay with a family member increased with household income, which may reflect the increased likelihood of higher income households paying for childcare pre-pandemic. Childcare can cost $10,000 or more a year if it can be found at all (Rexrode and Weber, 2020). Many childcare businesses did not survive the initial pandemic related closings, and those left have additional cleaning and personal protective gear expenses (Rexrode and Weber, 2020).

While age of children was not collected in the survey data, the probability childcare was impacted decreased with respondent age, perhaps reflecting older respondents who have older children, on average, not requiring childcare as younger children would. Supporting this hypothesis is the finding that the probability of taking on school activities increased as respondent age increased, reflecting the time allocation of older parents, with on average older children, towards schooling activities. Self-reporting gender as female statistically significantly increased the probability the respondent took on child schooling activities, adding to a growing body of literature citing COVID-19 consequences specifically for female caregivers, in addition to the universal consequences for parents. The most recent American Time Use Survey by the Bureau of Labor Statistics employs data from before the COVID-19 outbreak, but revealed full-time working women did more household work than men, like cooking and childcare (BLS, 2020). Additionally, the 2019 based analysis revealed on working days women were slightly more likely than men (26% compared to 22%) to do all of their work at home (BLS, 2020). The preexisting disproportionate load of unpaid domestic work on women (BLS, 2020) combined with their, albeit slight, relative propensity to be at home, set the stage for what is being seen today in national news and public debate about the toll of the pandemic on women's careers relative to men's.

In the US, the increase of employer-provided childcare options as well as the expansion of the public schooling system in recent decades target the overall growth in female employment – especially a rapid growth in employed mothers – which comes with the inevitable work-family time conflict (Ruhm, 2011). Simonsen (2010) found the cross-price elasticity responsiveness of female employment to childcare costs is approximately -0.17, indicating that as cost (and in the extreme case, availability) becomes a significant barrier, female employment decreases. A similar finding for young mothers in Germany followed in a working paper by Bauernschuster and Schlotter (2013). Taken together this implies the availability and accessibility of childcare most benefits women of lower income levels, and therefore may offer improved educational and career prospects for children of disadvantaged families in developed countries.

In the US, school-aged children have the option but not the obligation to attend public or private school. While subsidized childcare in the US is both sparse and heterogeneous in quality, it stands to reason that the studies investigating the impacts of childcare services on female employment apply in the American context. Indeed, with the tax-funded availability of diverse schooling options serving as a coarse proxy for subsidized childcare services, it stands to reason US female employment is higher than it would be without such options available. Hence, without them (in the event of a widespread, pandemic-induced closure) it is plausible to conclude US female employment has disproportionately suffered due to shutdowns of daycare centers and schools. This line of reasoning in existing literature is largely confirmed empirically by our results that women, more often than men, reported taking on schooling responsibilities after shutdowns induced by COVID-19. Not all cases involved termination of employment in order to take on the educational activities by women in the household; in many cases juggling of employment from home alongside childcare and/or shifting or reducing hours were reported. The

adjustments undertaken in all of these cases, however, illustrate the complexities and multiplicative nature of household stresses amassing to households, especially those with children present, during the pandemic.

While ability to work from home varies by profession, industry, and by a multitude of individual-specific factors, emerging evidence reveals gender inequality with respect to professional advancement activities during work-from-home. Kim and Patterson (2020) found evidence from analysis of social media use by political scientists for career advancement that the gap in work-related tweets between male and female academics roughly tripled following work-from-home. Thus, while the ability to work from home may aid in maintaining employment, compared to employment activities that must be conducted outside the home, the professional, economic, and societal implications of how adjustments impact individuals with varying demographics cannot be ignored.

Conclusions and Implications

Higher self-reported impacts on household activities and procurement of essential goods in households with children were documented. This analysis provides empirical support for the now popularized conversation around the disproportionate impacts of COVID-19 adjustments on women, including both with respect to reported impact on everyday activities and taking on caregiving activities. The societal impacts for loss of childcare and educational opportunities, alongside lost professional opportunities for caretakers, which could take years to materialize in measurable ways cannot be ignored.

Whilst this analysis focused exclusively on providing childcare, caregiving domestically should be explored more generally. Childcare and schooling offers an obvious entry into this

403 conversation as it is easily identified, measured, and quantified, but caregiving activities may
404 incorporate children, individuals with special or exceptional needs, elders, or short-term
405 caretaking of others who may be ill or in recovery from medical procedures. The COVID-19
406 pandemic with associated health concerns, including raised awareness for caregivers of those
407 who qualify as high risk for complications if they contract the disease, and associated household
408 and societal changes taking place simultaneously strain caregivers (Allegretto, 2020).
409
410

References

Acock ACA (2018) Gentle Introduction to Stata 6th ed. College Station: Stata Press.

Allegretto A (2020) 'There's just no voice for us': Pandemic creates more difficulties for caregivers. Pittwire. Available via https://www.pittwire.pitt.edu/news/there-s-just-no-voice-us-pandemic-creates-more-difficulties-caregivers. Accessed 7 Aug 2020.

Baruch GK, Biener L, Barnett RC (1987) Women and gender in research on work and family stress. Am Psychol 42(2): 130. https://doi.org/10.1037/0003-066X.42.2.130

Bateman N (2020) Working Parents are Key to COVID-19 Recovery. Brookings. Available via https://www.brookings.edu/research/working-parents-are-key-to-covid-19-recovery/. Accessed 10 Aug 2020.

Bauernschuster S, Schlotter M (2015) Public child care and mothers' labor supply—Evidence from two quasi-experiments. J Public Econ 123: 1-16. https://doi.org/10.1016/j.jpubeco.2014.12.013.

Bureau of Labor Statistics (2020) American Time Use Survey-2019 results. BLS. Available via https://www.bls.gov/news.release/pdf/atus.pdf. Accessed 21 Jul 2020.

Beer T (2020) Survey: 73% of Parents May Make Major Professional Changes if Schools Don't Fully Reopen. Forbes. Available via https://www.forbes.com/sites/tommybeer/2020/08/06/survey-73-of-parents-may-make-major-professional-changes-if-schools-dont-fully-reopen/?utm_source=TWITTER&utm_medium=social&utm_content=3559117554&utm_campaign=sprinklrForbesMainTwitter#769b2f0a1b49. Accessed 21 Jul 2020.

Cappellari L, Jenkins SP (2003) Multivariate probit regression using simulated maximum likelihood. The Stata Journal 3(3): 278-294. https://www.stata-journal.com/sjpdf.html?articlenum=st0045

CBS News (2020) 6 states report record-high jumps in coronavirus cases as reopening plans weighed. CBS News. Available via https://www.cbsnews.com/news/coronavirus-cases-6-states-report-record-highs/. Accessed 18 Jun 2020.

CDC (2020a) COVID-19 Cases. Available via https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html. Accessed 18 Jun 2020.

CDC (2020b) People at Increased Risk of Severe Illness. Available via https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-increased-risk.html. Accessed 31 Jul 2020.

CDC (2020c) Older Adults. Available via https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html. Accessed 31 Jul 2020.

CDC (2020d) People with Certain Medical Conditions. Available via https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html. Accessed 31 Jul 2020.

CDC (2020e) Considerations for wearing masks. Available via https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html. Accessed 10 Aug 2020.

Gosset WS (1908)The probable error of a mean. Biometrika. 6: 1–25.

Greene WH (2003) Econometric Analysis, Prentice Hall. New Jersey.

Havnes T, Mogstad M (2011) No child left behind: Subsidized child care and children's long-run outcomes. Am Econ J Macroecon 3(2): 97-129. https://doi.org/10.1257/pol.3.2.97

Kantar (2020) About Kantar. Kantar. Available via https://www.kantar.com/about. Accessed 29 Jun 2020.

Marfin C (2020) No, wearing a mask doesn't have any negative health effects. Available via https://www.dallasnews.com/news/public-health/2020/07/05/no-wearing-a-face-mask-doesnt-have-any-negative-health-effects/. Accessed 4 Aug 2020.
McLean Hospital (2020) Navigating the stresses of Caring for a Loved One During a Pandemic. McLean Harvard Medical School Affiliate. Available via https://www.mcleanhospital.org/news/navigating-stresses-caring-loved-one-during-pandemic. Accessed 31 Jul 2020.
Miller AM (2020) CDC: Older Americans should consider stocking up on food and medications and avoid venturing out as coronavirus spreads. Business insider. Available via https://www.businessinsider.com/cdc-americans-over-60-stock-up-on-groceries-stay-home-2020-3. Accessed 7 Aug 2020.
Monte LM (2020) New census household pulse survey shows more households with children lost income, experienced food shortages during pandemic. United States Census Bureau. Available via https://www.census.gov/library/stories/2020/05/adults-in-households-with-children-more-likely-to-report-loss-in-employment-income-during-covid-19.html. Accessed 7 Aug 2020.
Mullahy J (2017) Marginal effects in multivariate probit models. Empir Econ 52(2): 447-461. https://doi.org/10.1007/s00181-016-1090-8
O'Sullivan T, Amaratunga C, Phillips K, et al (2009) If schools are closed, who will watch our kids? Family caregiving and other sources of role conflict among nurses during large scale outbreaks. Prehosp Disaster Med 24: 321-325.
Paisner E (2020) Back-to-School 2020: Care.com survey reveals what's really on the minds of working parents. Care@work. Available via https://workplace.care.com/workingparentssurvey. Accessed 31 Jul 2020.
Panchal N, Kamal R, Orgera K et al (2020) The Implications of COVID-19 for Mental Health and Substance Use. KFF Available via https://www.kff.org/coronavirus-covid-19/issue-brief/the-implications-of-covid-19-for-mental-health-and-substance-use/. Accessed 31 Jul 2020.
Patterson S, Kim E (2020) The pandemic and gender inequality in academia. Available via https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3666587. Accessed 4 Aug 2020.
Qualtrics (2020) Online Survey Tool. Qualtrics.. Available via https://www.qualtrics.com/core-xm/survey-software/. Accessed 29 Jun 2020.
Rexrode C, Weber L (2020) Working parents are hitting their coronavirus breaking point-and paying for it. Available via https://www.wsj.com/articles/working-parents-are-hitting-their-coronavirus-breaking-pointand-paying-for-it-11597483801. Accessed 19 Aug 2020.
Ruhm CJ (2011) Policies to assist parents with young children. The future of children/Center for the Future of Children, the David and Lucile Packard Foundation 21(2): 37.
Simonsen M (2010) Price of High-quality Daycare and Female Employment. Scand J Econ 112(3): 570-594. https://doi.org/10.1111/j.1467-9442.2010.01617.x
StataCorp (2019) Stata Statistical Software: Release 16. College Station: StataCorp LLC;
Tingley K (2020) Why is there no consensus about reopening schools. New York Times Magazine. Available via https://www.nytimes.com/2020/07/29/magazine/schools-reopening-covid.html. Accessed 4 Aug 2020.
Welch BL (1947) The generalization of 'student's' problem when several different population variances are involved. Biometrika 34: 28–35.

Winefield HR (2000) Stress reduction for family caregivers in chronic mental illness: Implications of a work stress management perspective. Int J Stress Manag 7(3): 193-207.

U.S. Census Bureau, Current Population Survey, 2019 Annual Social and Economic Supplement Internet Release Date: November 2019 http://www2.census.gov/programs-surveys/cps/techdocs/cpsmar19.pdf

The Economist (2020) The COVID-19 Pandemic is Forcing a Rethink in Macroeconomics. Available via https://www.economist.com/briefing/2020/07/25/the-covid-19-pandemic-is-forcing-a-rethink-in-macroeconomics. Accessed 31 Jul 2020.

The World Bank (2020) The Global Economic Outlook During the COVID-19 Pandemic: A Changed World. The World Bank. Available via https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world. Accessed 31 Jul 2020.

U.S. Census Bureau (2020) Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2015. 2016

Viner R, Russell S, Croker H et al (2020) School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. Lancet Child Adolesc Health 4(5): 397-404. https://doi.org/10.1016/S2352-4642(20)30095-X

Table 1. Demographics for respondents who reported children in their household and those that did not report children in their household. Percentage of respondents.

Demographic Variable	Children in the Household n=347	No Children in the Household n=851
Gender		
Male	41$^{\Psi}$	50$^{\Psi}$
Female	58$^{\Psi}$	50$^{\Psi}$
Age		
18-24	12	10
25-34	29$^{\Psi}$	13$^{\Psi}$
35-44	30$^{\Psi}$	11$^{\Psi}$
45-54	21$^{\Psi}$	17$^{\Psi}$
55-65	5$^{\Psi}$	22$^{\Psi}$
65 +	3$^{\Psi}$	27$^{\Psi}$
Income		
$0-$24,999	24	24
$25,000-$49,999	19$^{\Psi}$	27$^{\Psi}$
$50,000-$74,999	14$^{\Psi}$	20$^{\Psi}$
$75,000-$99,999	14	13
$100,000 and higher	28$^{\Psi}$	16$^{\Psi}$
Education		
Did not graduate from high school	4	2
Graduated from high school, Did not attend college	29	29
Attended College, No Degree earned	25	23
Attended College, Associates or Bachelor's Degree earned	27$^{\Psi}$	33$^{\Psi}$
Attended College, Graduate or Professional Degree earned	15	13
Region of residence		
Northeast	20	18
South	40	39
Midwest	20	22
West	20	21
State COVID status		
High number of cases	66	68
High number of cases by population	14	15
High increase in cases	22	23
Perceived COVID risk	Mean (SD)	Mean (SD)
Someone in my household, or that I frequently spend time, with is at higher risk of complications of COVID-19 [1]	2.919 (0.082)	2.914 (0.053)
I am in the higher risk group for complications of COVID-19 [1]	2.571 $^{\Psi}$ (0.078)	2.976 $^{\Psi}$ (0.052)

$^{\Psi}$Indicates the percentage or mean of respondents who indicated they had children in their household and those that did not is statistically different at the <0.05 level

[1]Indicated on a scale from 1 (strongly disagree) to 5 (strongly agree).

Table 2. Comparison between the percentage of respondents with and without children in the household who believe the following statements regarding masks. (Percentage of respondents)

	Children in the Household N=347	No Children in the Household N=851
YES - masks have some potential role in U.S. society related to the spread of viral disease	82	84
Wearing a mask helps prevent the spread of COVID-19	62$^{\Psi}$	73$^{\Psi}$
Wearing a mask helps prevent me from getting COVID-19	51	54
Wearing a mask helps prevent me from spreading COVID-19	59$^{\Psi}$	66$^{\Psi}$
Wearing a mask will help prevent future lock-downs in my community related to COVID-19	41$^{\Psi}$	50$^{\Psi}$
There is social pressure in my community to wear a mask	33	30
Wearing a mask does not prevent the spread of COVID-19	16	13
Wearing a mask has negative health consequences for the mask wearer	17$^{\Psi}$	11$^{\Psi}$

$^{\Psi}$Indicates the percentage of respondents who indicated there were children in their household and selected yes to that statement is statistically different from the percentage of people who did not indicate there were children in the household and said yes to that statement. <0.05 level

Table 3. Impact level of COVID-19 on daily life for those who reported children in the household (Kids N=347) and those who did not report children in the household (No Kids N=851) and mean response for both groups for all respondents who did not select does not apply to me (n given in table).

	1 (Not impacted)		2		3		4		5 (Impacted)		Does not apply to me		Mean (St Dev)	
Household Activity	Kids	No Kids	Kids	No Kids	Kids	No Kids	Kids	No Kids	Kids	No Kids	Kids	No Kids	Kids	No Kids
Respondents daily activities outside of work/school	6%	15%	5%	10%	17%	18%	26%	20%	41%	28%	4%	9%	3.93ab$^{\Psi}$ (1.19) N=333	3.40a$^{\Psi}$ (1.44) N=773
Ability to buy paper products (e.g., toilet paper, paper towels)	8%	17%	10%	10%	17%	20%	28%	24%	35%	27%	2%	2%	3.74b$^{\Psi}$ (1.26) N=339	3.36a$^{\Psi}$ (1.42) N=833
Ability to find meat, milk, and perishable grocery items	12%	23%	14%	17%	20%	23%	27%	20%	25%	14%	2%	3%	3.40c$^{\Psi}$ (1.33) N=341	2.85b$^{\Psi}$ (1.38) N=826
Ability to execute travel plans	7%	12%	3%	4%	13%	9%	19%	12%	45%	38%	13%	25%	4.07a$^{\Psi}$ (1.22) N=301	3.80c$^{\Psi}$ (1.50) N=634
Activities related to respondent's work/school	8%	17%	6%	6%	10%	9%	20%	11%	46%	24%	11%	33%	4.00a$^{\Psi}$ (1.30) N=309	3.29a$^{\Psi}$ (1.62) N=571

[1]Matching letters indicate the mean is statistically different down the column. For example the mean for respondents daily activities outside of work/school is statistically different than ability to find meat, milk and perishable grocery items at the <0.05 level.

$^{\Psi}$Indicates the mean is statistically different between those who have children and do not have children for that activity at the <0.05 level.

Table 4. Ordinary least squares model of the impact of COVID-19 on respondents activities on a scale of 1 (not impacted) 5 (impacted). Respondents who indicated the activity applied to them, N given in table.

	Respondents daily activities outside of work/school		Ability to buy paper products (e.g., toilet paper, paper towels)		Ability to find meat, milk, and perishable grocery items		Ability to execute travel plans		Activities related to respondent's work/school	
N=	1106		1172		1167		935		880	
R-squared	0.0882		0.0511		0.078		0.0825		0.1176	
Prob>F	<0.000		<0.000		<0.000		<0.000		<0.000	
	Coef. (SE)	P-Value	Coef. (SE)	P-Value	Coef. (SE)	P-Value	Coef. (SE)	P-Value	Coef. (SE)	P-Value
Children present in the household	0.375 (0.094)	<0.000	0.272 (0.094)	0.004	0.360 (0.093)	<0.000	0.197 (0.103)	0.055	0.474 (0.110)	<0.000
Female	0.350 (0.081)	<0.000	0.284 (0.080)	<0.000	0.273 (0.079)	0.001	0.010 (0.090)	0.907	0.235 (0.100)	0.019
Age	-0.088 (0.026)	0.001	-0.070 (0.026)	0.008	-0.146 (0.026)	<0.000	0.007 (0.029)	0.814	-0.198 (0.034)	<0.000
Income	0.095 (0.029)	0.001	0.015 (0.028)	0.597	-0.024 (0.028)	0.389	0.222 (0.032)	<0.000	0.114 (0.036)	0.001
State with high number of cases	0.171 (0.089)	0.055	0.045 (0.087)	0.608	-0.000 (0.086)	0.994	0.030 (0.098)	0.763	0.308 (0.109)	0.005
State with high number of cases per capita	0.050 (0.119)	0.676	-0.201 (0.117)	0.087	-0.160 (0.116)	0.166	-0.008 (0.133)	0.95	-0.141 (0.145)	0.331
State with high increase in cases	-0.112 (0.099)	0.257	-0.221 (0.098)	0.024	-0.107 (0.097)	0.269	-0.038 (0.110)	0.728	-0.154 (0.123)	0.212
Believes masks have a role	0.532 (0.108)	<0.000	0.455 (0.108)	<0.000	0.335 (0.107)	0.002	0.458 (0.122)	<0.000	0.484 (0.131)	<0.000
Constant	2.868 (0.179)	<0.000	3.206 (0.179)	<0.000	3.292 (0.176)	<0.000	2.749 (0.197)	<0.000	3.241 (0.217)	<0.000

Table 5. Individual probit models of child related occurrences due to COVID-19

	My child was no longer able to attend daycare, stay with a family member etc for childcare			I had to take on schooling activities for my child			I was not able to continue working or had to cut back on work hours due to childcare responsibilities			My childcare and educational routine did not change due to COVID-19		
Pseudo R-squared	0.0387			0.0634			0.0660			0.0231		
Prob>Chi squared	0.0111			<0.000			<0.000			0.0231		
	Coefficient (SE)	Marginal effect (SE)	P-value[2]	Coefficient (SE)	Marginal effect (SE)	P-value[2]	Coefficient (SE)	Marginal effect (SE)	P-value[2]	Coefficient (SE)	Marginal effect (SE)	P-value[2]
Female	-0.100 (0.163)	0.028 (0.045)	0.541	0.309 (0.147)	0.123 (0.058)	0.035	-0.094 (0.160)	0.032 (0.054)	0.558	-0.079 (0.162)	0.022 (0.047)	0.629
Age	-0.159 (0.073)	-0.044 (0.020)	0.028	0.283 (0.064)	0.113 (0.025)	<0.000	-0.292 (0.074)	0.098 (0.025)	<0.000	-0.098 (0.069)	0.028 (0.020)	0.154
Income	0.140 (0.054)	0.038 (0.015)	0.010	-0.034 (0.049)	0.013 (0.019)	0.486	-0.049 (0.054)	0.016 (0.018)	0.361	0.070 (0.054)	0.020 (0.015)	0.195
COVID-19 impact on daily activities outside of work[1]	0.100 (0.070)	0.027 (0.019)	0.154	0.138 (0.060)	0.055 (0.024)	0.022				-0.141 (0.064)	0.040 (0.018)	0.027
COVID-19 impact on activities related to your work/school[1]							0.145 (0.064)	0.048 (0.021)	0.024			
Constant	-1.002 (0.431)			-1.637 (0.378)			0.143 (0.393)			-0.055 (0.389)		

[1] On a scale of 1 (not impacted) 5 (impacted)

[2]This is the p-value of the marginal effect

Table 6. Multivariate probit models of child related occurrences due to COVID-19

	My child was no longer able to attend daycare, stay with a family member etc for childcare		I had to take on schooling activities for my child		I was not able to continue working or had to cut back on work hours due to childcare responsibilities		My childcare and educational routine did not change due to COVID-19	
	Coefficient (SE)	P-value	Coefficient (SE)	P-value	Coefficient (SE)	P-value	Coefficient (SE)	P-value
Female	-0.044 (0.168)	0.795	0.341 (0.152)	0.025	-0.007 (0.162)	0.966	0.005 (0.157)	0.977
Age	-0.189 (0.080)	0.019	0.249 (0.070)	<0.000	-0.299 (0.075)	<0.000	-0.112 (0.073)	0.123
Income	0.136 (0.057)	0.017	-0.032 (0.051)	0.536	-0.031 (0.054)	0.574	0.063 (0.054)	0.245
COVID-19 impact on daily activities outside of work[1]	0.137 (0.077)	0.074	0.133 (0.064)	0.038			-0.174 (0.063)	0.006
COVID-19 impact on activities related to your work/school[1]					0.122 (0.063)	0.053		
Constant	-1.031 (0.455)	0.023	-1.461 (0.400)	<0.000	0.190 (0.396)	0.632	0.182 (0.379)	0.63

[1] On a scale of 1 (not impacted) 5 (impacted)

Note: Prob>Chi squared is <0.000. Likelihood ratio test that the correlation of the residuals between the equations is equal to zero is rejected at the <0.000 level.