Gender Analysis of the American Time Use Survey, 2003-2021

Overview

Due to long-standing norms and expectations regarding gender, we might expect that men and women spend time differently. For example, we could assume that women spend more time on unpaid child care and household management than men do, as men spend more time on paid labor. However, as more women work outside the home, we might also assume that women are spending less time on domestic labor over time, while men make up the difference. We aimed to verify whether this is the case and answer the general question, do men and women spend their time differently? To do so, we conducted an analysis of the U.S. Bureau of Labor Statistics (BLS) American Time Use Survey (ATUS) using a gender lens.[1]

Dataset

The ATUS is the United States' first federally administered, continuous survey on time use, with the goal of measuring how people divide their time among life's activities. The universe of respondents is composed of the civilian, non-institutional population residing in occupied households in the United States that are at least 15 years of age.[2] Respondents are asked about time spent doing activities like working, cleaning, education, leisure, and eating and sleeping. We used the multi-year ATUS 2003-2021 Activity Summary file, consisting of daily time use data, in minutes, from 2003 to 2021. This dataset contains 228,455 rows representing each interview respondent and 456 columns/variables. A brief overview of the different data files, including the Activity Summary file, can be found on the ATUS website.

Guiding Questions

Our analysis was based on the following guiding questions:

1. Do people of different sexes spend time differently? Have the sex differences in time use changed over time?
2. What are the categories of activities that have the biggest difference in time spent between the sexes?
3. Were any of the differences in time spent on the activities between the sexes affected by COVID-19?

[1] The ATUS survey currently only tracks sex as a binary variable, male or female, as provided by the respondent, so we were unable to examine gender inclusive of nonbinary identities.

[2] *American Time Use Survey User's Guide*. (n.d.). U.S. Census Bureau. https://www.bls.gov/tus/atususersguide.pdf

Dataset Clean-up & Analysis Process

To answer our guiding questions, we started with reviewing the dataset documentation. ATUS provides extensive documentation through the User Guide, Activity Lexicon, and Interview Data Dictionary, which define the coding system for respondent information and activities.

In general, the ATUS dataset is clean. Data is entered consistently and appropriately. Non-responses for respondent demographic information are coded as -1, -2, or -3. For time spent on activities, entries were a value of 0 for no time spent. For the variables we were examining, sex and activity codes, we did not have an issue with adjusting for non-responses. The major cleaning we did was to filter for the variables we were not examining, such as respondent geographic location.

In order to answer how people spend their time, we used the ATUS provided formula and instructions for calculating average time spent per day for population estimates, as ATUS describes this as a common way of using the dataset. Average hours per day on an activity seemed like an accurate way of getting a snapshot of a person's daily life and how people spend their time. As a result, **our general clean-up and analysis process was**:

1. Filter the 456 columns to only those we were investigating, i.e., sex and activities
2. Prepare the dataset to calculate average time spent per day for subpopulations and targeted activities
3. Calculate the average time spent per day using the following formula, provided in the ATUS User Guide:

Average hours per day. $\bar{T}_j$, the average number of hours per day spent by a given population engaging in activity j, is given by

$$\bar{T}_j = \frac{\sum_i fwgt_i T_{ij}}{\sum_i fwgt_i}$$

where T_{ij} is the amount of time spent in activity j by respondent i, and $fwgt_i$ is the final weight for respondent i.

Preparing the dataset for calculations required creating the following columns:

- **correct_wgt (*fwgt*$_i$):** Correct weight[3] for each respondent – selected based on respondent year
    - ATUS-created weights are provided in two separate columns, one for all years except 2020, and one for the 2020 weights

[3] The ATUS results are not composed from a stratified random sample, so ATUS creates weights to use to create population estimates from the survey results. The weights correct for overrepresentation in the sample, such as more female respondents, and more weekend days reported, which we confirmed in the data exploration process.

    - **Assumption:** If the respondent year was 2020, we selected the weight from the 2020 column, else we used the other weight
- **act_total (T_{ij}):** Sum of time spent on the targeted activity's sub-activities (ex. Laundry, interior cleaning, etc. if examining household activities)
- **wgt_act_time ($fwgt_i \times T_{ij}$):** Weighted time spent = **act_total** x **correct_wgt**

With these columns, the next step was then to sum the weighted time for the population and divide by the sum of all the weights for that population.

The process was repeated as needed to analyze activity categories and subpopulations.

Data Decisions

- We decided to create and include annual estimates for the 2020 data for our time-series graphs, though the ATUS data for 2020 is incomplete. Due to COVID-19, BLS did not conduct interviews from March to mid-May of 2020. While the 2020 annual estimate is less reliable than other years, for time comparison, we felt it was more helpful to include rather than exclude, though exact values should be treated with some skepticism.
- We defined activity categories differently than ATUS. We attempted to verify our time use estimates by sex with those provided by ATUS and found they grouped and defined activity categories slightly differently. We decided to map our activity categories to the Lexicon groups for simplicity.

Analysis of 2021 Data for Time Differences between Sexes

We initially filtered our dataset down to 2021-specific data to understand how men and women might have spent their time differently. We charted the following to visually compare time spent per day on each activity across sexes.

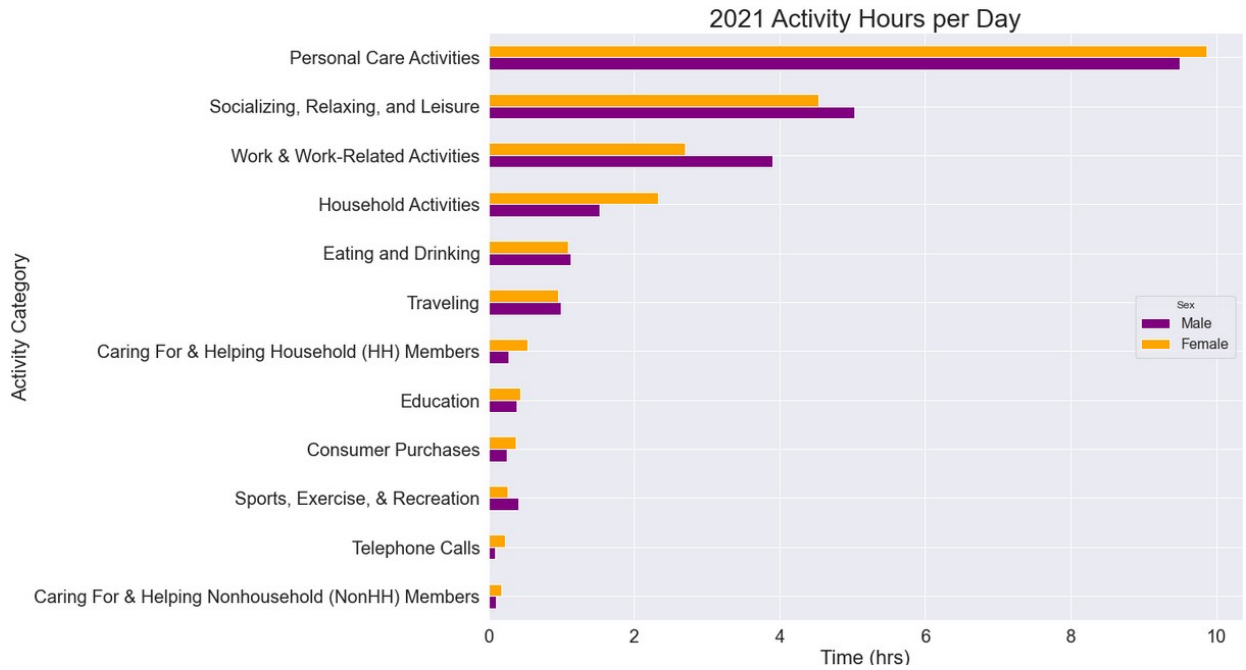

Figure 1: 2021 Activity Breakdown by Sex

Note that in Figure 1 above, we excluded six categories that people spent little time on in 2021. Men and women reported spending less than 0.5 hours per day on all six categories combined. Information regarding these six activities can be found in Table A-1: Six Activities Excluded from Analysis in the Appendix.

To investigate the remaining categories further, we calculated the raw and percent differences in average hours per day between women and men. Activities closer to the top of Table 1 below represent activities that women spent more time on than men. Conversely, activities closer to the bottom of the table represent activities that men spent more time on than women.

Table 1: Raw Differences in Average Hours per Day between Women and Men

Activity	Raw Difference Female vs. Male
Household Activities	0.804665
Personal Care Activities	0.374589
Caring For & Helping Household (HH) Members	0.258615
Telephone Calls	0.133301
Consumer Purchases	0.12332
Caring For & Helping Nonhousehold (NonHH) Members	0.078731
Education	0.052877
Eating and Drinking	-0.035362
Traveling	-0.035775
Sports, Exercise, & Recreation	-0.142837
Socializing, Relaxing, and Leisure	-0.495448
Work & Work-Related Activities	-1.197102

The differences we found may appear small, but the difference in time spent per day grows as you scale the time spent up to per week, month, or even year. Even half an hour a day is equivalent to 182 hours per year, or over four 40-hour work weeks.

Given the visual and raw differences for all activity categories[4], we further investigated the following five categories to see trends over time;

- Working & Work-related Activities
- Household Activities
- Socializing, Relaxing, and Leisure
- Personal Care Activities
- Caring For & Helping Household (HH) Member

We wanted to determine if 2021 was unique compared with past results, if 2020 (COVID-19) had an impact on these activities, or if differences in these categories have been consistent over time. Therefore, we took each of the five categories above and looked at all years in our dataset, from 2003 to 2021.

Analysis by Activity Category[5]

Working and Work-Related Activities

As seen in Figure 2, men report spending more time on working and work-related activities per day than women do every year since 2003. The difference seems to decrease as time progresses. Overall, men are working fewer hours while women work around the same hours.

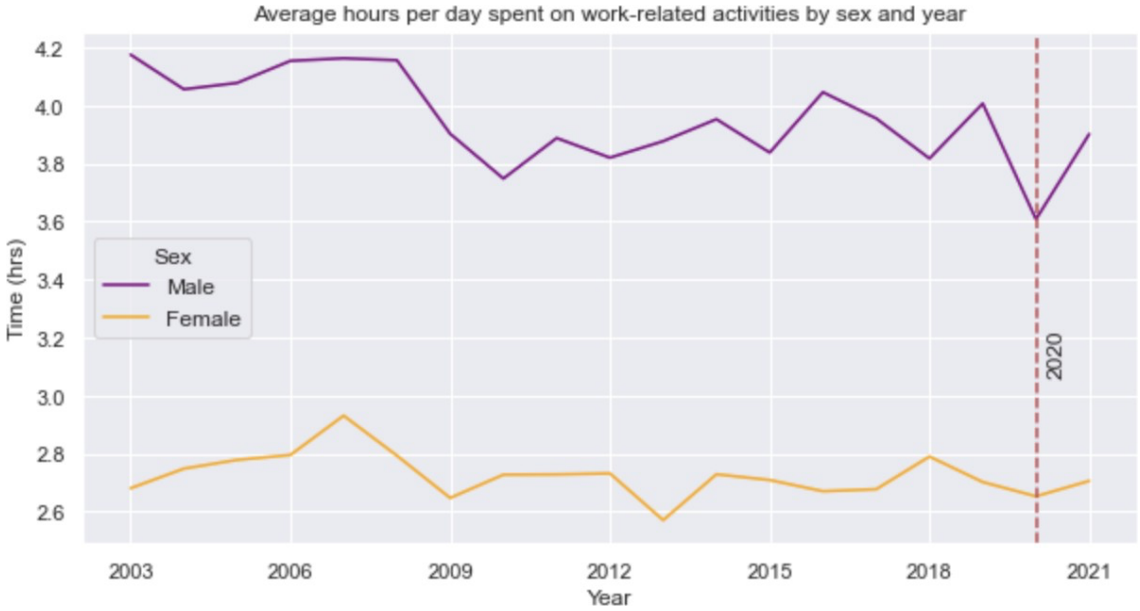

Figure 2: Average hours per day spent on work-related activities by sex and year

[4] See Table A-2: 2021 Raw Difference vs. Percentage Difference by Sex in the Appendix for percentage differences.
[5] Tables for all the activity categories can be found in the Appendix, Activity Category Tables, Average Time by Sex, 2003-2021, Tables A-3 to A-7.

As seen from the line graph, COVID-19 may have had some impact on the time spent on working – men reported spending almost 0.4 hours less per day on working. However, by 2021, the average hours per day spent working for men seems to return to the regular hours pre-pandemic. For women, COVID-19 seems to have less impact on their time spent on working and work-related activities.

The general trend looks similar for men and women – average hours per day spent on working and work-related activities are both the highest in the pre-COVID time and lowest in 2020. Figure A-2 in the Appendix displays a more detailed look at time spent on working and work-related activities across COVID-19 timeline.

Household Activities

As seen in Figure 3, women report spending more time on household activities per day than men every year since 2003.

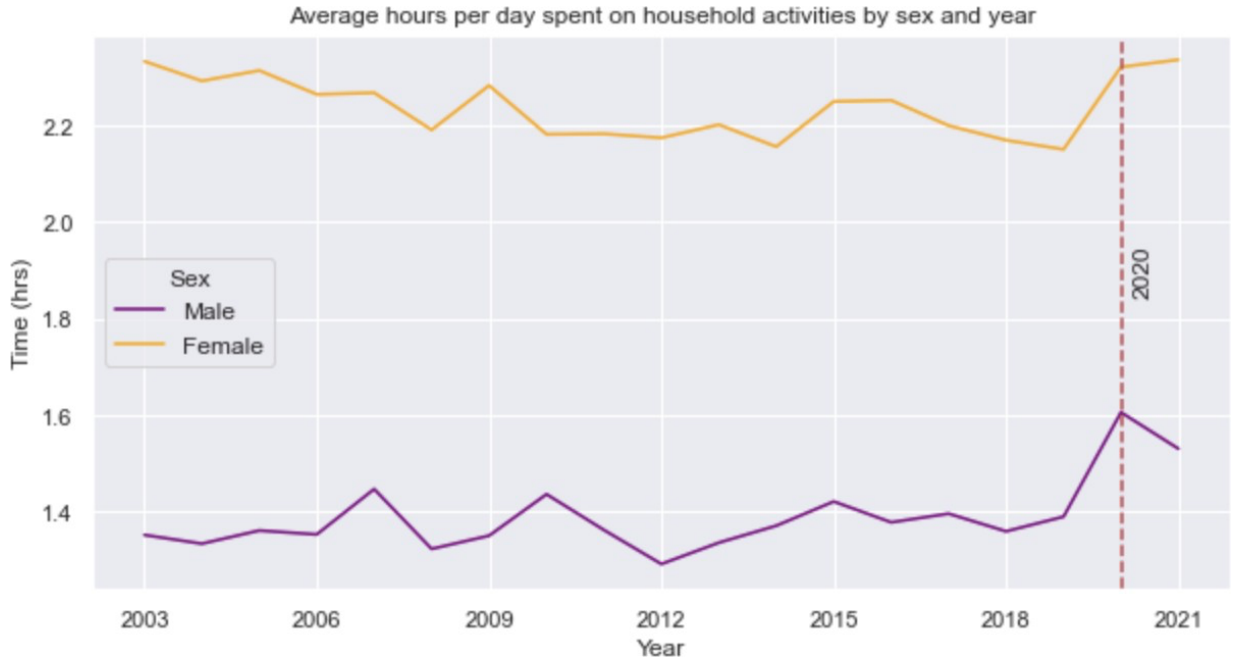

Figure 3: Average hours per day spent on household activities by sex and year

Taking a close look at the graph, we can see that the difference may be shrinking, with the lines coming closest together in 2019 and 2020. But by 2021, the difference increased in comparison to 2020. The time that men spent on household activities in 2021 remains higher than prior to COVID-19, roughly 1.54 hours per day, though less than the average time spent in 2020, while women reported spending their historically highest amount of time on household activities since 2003.

COVID-19 may have had a minor effect on the time spent on household activities, prompting both men and women to spend more time on household activities, though men appear to be returning to past levels while women are spending even more time on household activities.

Socializing, Relaxing, and Leisure

Overall, men consistently spent more time on socializing, relaxing and leisure than women. By 2020, the difference increased to 0.82 hours per day.

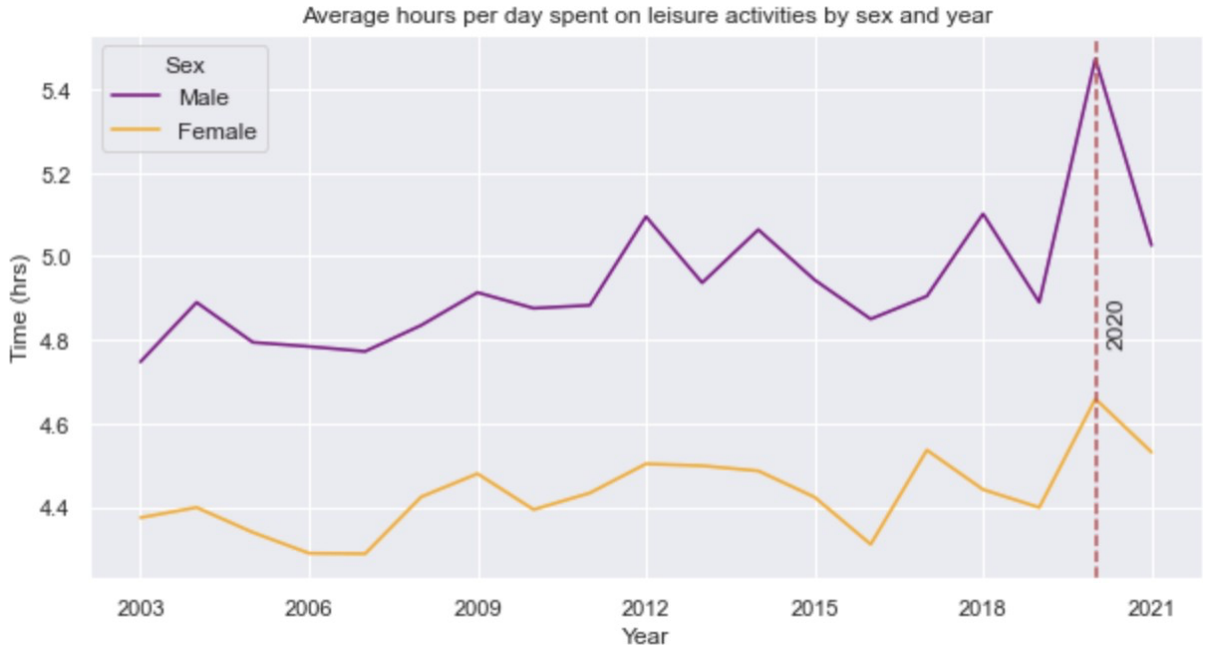

Figure 4: Average hours per day spent on leisure activities by sex and year

The difference between time spent by men and women increased from 0.49 hours to 0.81 hours in 2020. However, by 2021, we see the difference drop back to 0.50 hours. It is evident that COVID-19 may have exacerbated the difference in time spent on leisure activities by sex. Figure A-4 in the Appendix compares time spent on leisure activities by sex on the COVID-19 timeline.

Personal Care Activities

Women consistently spent more time on personal care activities than men do. The difference between time spent between men and women is the lowest at 0.33 hours in 2008 and the highest at 0.52 hours in 2013. Overall, however, both men and women seem to have spent more time on personal care activities as time progresses.

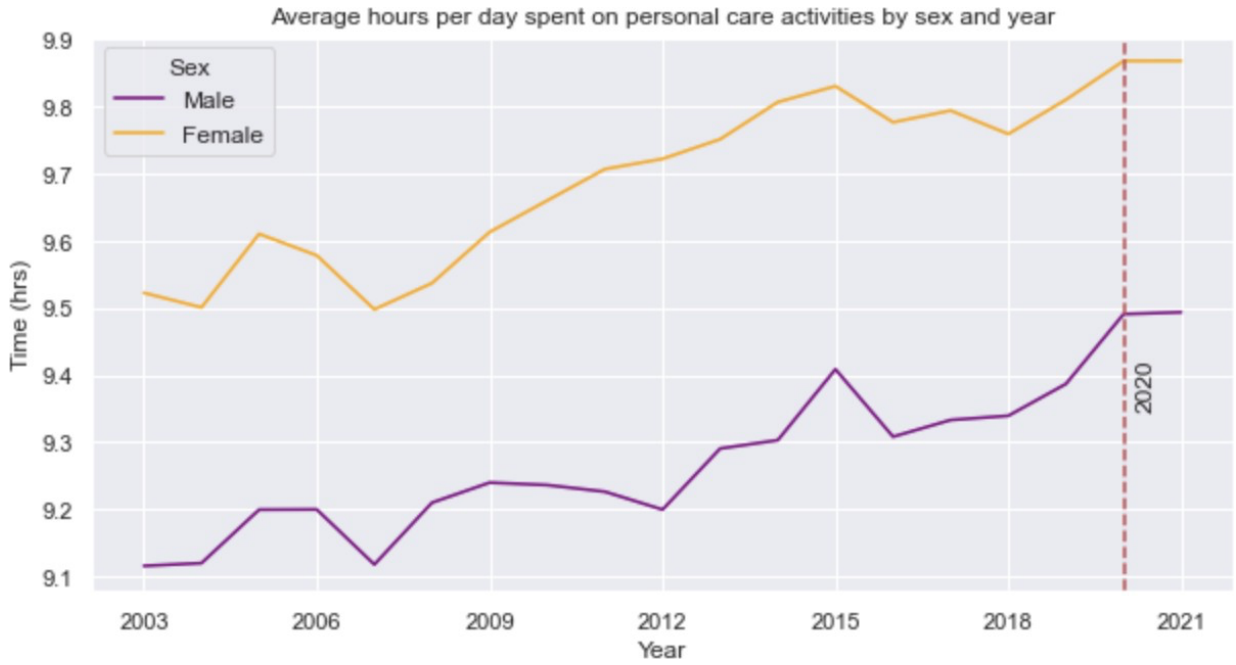

Figure 5: Average hours per day spent on personal care activities by sex and year

The difference between time spent on personal care activities by men and women is shrinking across the COVID-19 timeline. The difference decreased from 0.43 hours to 0.38 hours comparing average time spent on personal care activities during pre-pandemic with the average during COVID-19 pandemic. Figure A-5 in the Appendix compares time spent on personal care activities by sex on a COVID-19 timeline.

Caring for and Helping Household Members

Women reported spending an average of 0.54 hours on caring for household members in 2021 while men spent an average of 0.28 hours per day. Women consistently spent more time caring for household members than men. However, it can be seen in Figure 6 that women have reported spending less time caring for household members as time progresses. Starting in 2003, women reported spending an average of 0.64 hours per day. By 2021, however, women spent an average of 0.54 hours per day caring for household members. This number decreased by 0.10 hours.

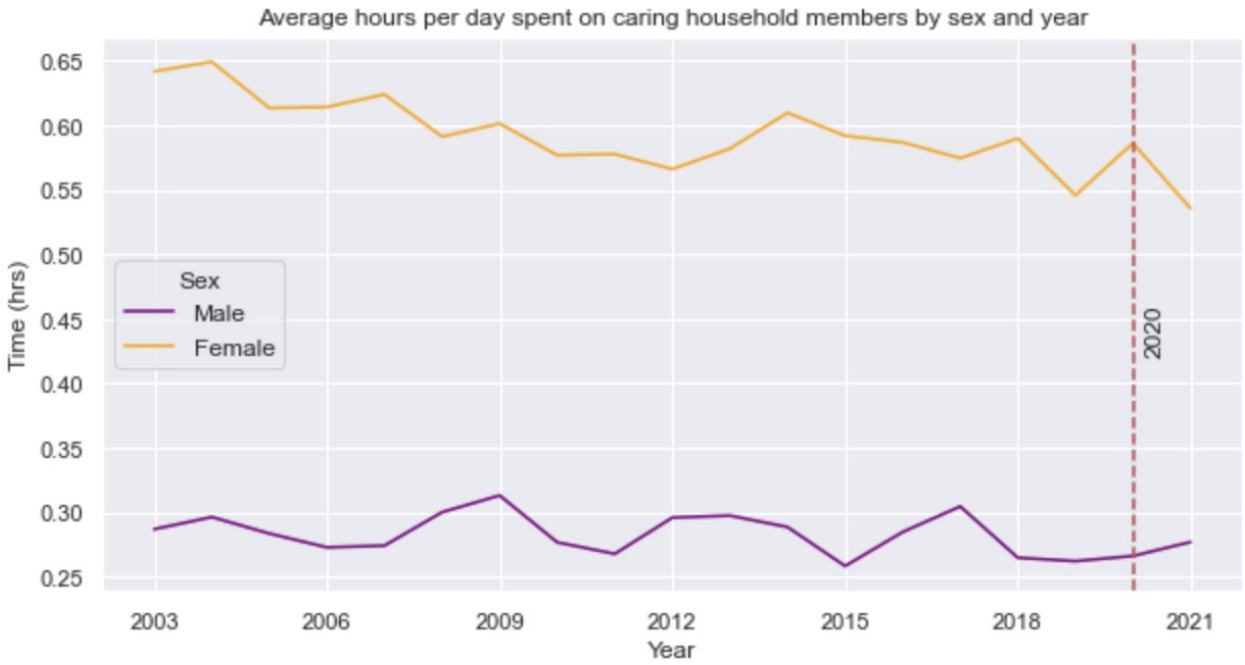

Figure 6: Average hours per day spent on caring for household members activities by sex and year

Conclusion

At the beginning of our research, we wanted to understand if there were differences between the way men and women spend their time, according to the ATUS survey results. We looked at the different activity categories and found that, generally, men and women have spent their time differently over the 2003-2021 time period. More specifically, we investigated the five categories with the largest difference (in hours/day) between the sexes in 2021.

Within the five categories, men spent more time on **Working & Work-related Activities**, and **Socializing, Relaxing and Leisure**. Women, on the other hand, spent more time on **Household Activities, Personal Care Activities,** and **Caring For & Helping Household (HH) Members** activities.

For all of these five categories, since 2003 (the initial year of the ATUS survey), men and women seem to have kept the same division of labor, with slight fluctuations over time. In other words, since 2003, men have *always* spent more time on **Working & Work-related Activities** and **Socializing, Relaxing and Leisure**, while women have *always* spent more time on **Household Activities**, **Personal Care Activities**, and **Caring For & Helping Household (HH) Members**.

Activity Specific Findings

- **Work & Work-Related Activities**: Men are working less over time, while women haven't experienced much change, decreasing the gap between the sexes.

- **Household Activities**: Both sexes experienced a spike in 2020, however, 2021 shows that women are spending additional time here, while men are returning to pre-2020 levels, potentially further increasing the gap between sexes.
- **Socializing, Relaxing, Leisure:** Both sexes experienced the highest average hours/day on record in 2020, but 2021 shows it normalizing, keeping the gap between the sexes consistent.
- **Personal Care Activities:** Men and women are both seeing a consistent increase in this activity since 2003, maintaining a similar gap between sexes over the same time period.
- **Caring For & Helping Household Members:** Time spent in this activity averaged less than 1 hour/day since 2003; however, women consistently spent almost twice as much time as their male counterparts. Women are, however, trending downwards while men remain consistent.

Based on the results, COVID-19 seems to have had the highest impact on **Work & Work-Related Activities, Household Activities,** and **Socializing, Relaxing, Leisure.** For the most part, 2021 shows each sex trending towards pre-2020 levels, with the one exception being **Household Activities** for women, which continued to rise in 2021.

These findings suggest more work could be done to investigate the drivers of the differences in time use by sex. The ATUS dataset offers more demographic data than we were able to take advantage of in this project, such as information on number of children in the household, age, level of education, and income. Examining these factors could provide more insight into why men and women spend time differently, or if the gender divide remains constant across demographics.

Appendix

ATUS Reference Links

ATUS Multi-Year Data Files • ATUS 2003-2021 Activity summary file	Page with links to the micro data files, data dictionaries, and other related files, like survey documentation
ATUS 2003-2021 Interview Data Dictionary	Provides column codes and definition for respondent-specific information, like sex
ATUS 2003-2021 Activity Lexicon	Code book for activities tracked
ATUS User's Guide	A general guide to using the ATUS survey results, including providing formulas and examples of calculating time use
ATUS How to	Provides overview of how to use the ATUS microdata files and provides a brief summary of each data file

Respondent Age Distribution by Sex

During the data exploratory process, we examined respondents and found overrepresentation of women at nearly every age group.

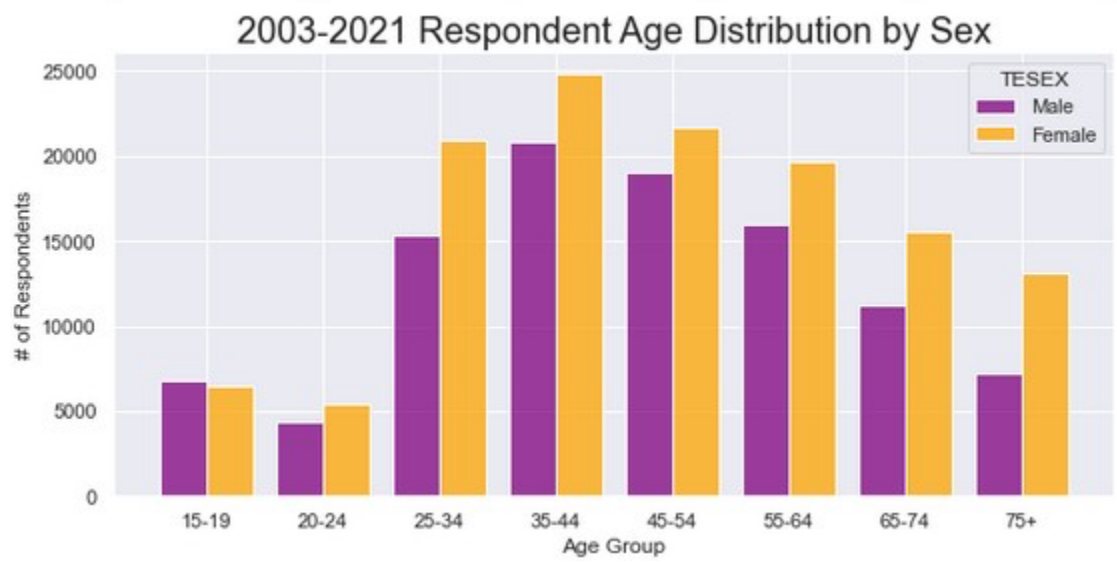

Figure A-1: Respondent Age Distribution by Sex

ATUS Columns/Variables Used for Analysis

These were the ATUS codes for the columns/variables we used during the analysis process.

Respondent Codes	
TUYEAR	Respondent year
TU20FWGT	Weight for 2020 responses
TUFINLWGT	Weight for 2003-2019, 2021 responses
Activity Codes	
t010101 - t019999	Personal Care Activities
t020101 - t029999	Household Activities
t030101 - t039999	Caring for and Helping Household (HH) Members
t050101 - t059999	Work & Work-Related Activities
t120101 - t129999	Socializing, Relaxing, and Leisure

Activity Categories Excluded from Detailed Analysis

Due to minimal difference in time spent between men and women in the following activity categories, we did not conduct further analysis on these activities. The difference between men and women spent on these activities was in the range of about 0.0001 to 0.03 hours per day. The highest categories range from 0.26 hours and 0.9 hours per day, roughly.

Table A-1: Six Activities Excluded from Analysis

Activity Category	**Average hours per day spent by Men**	**Average hours per day spent by Women**
Government Services & Civic Obligations	0.002135	0.002264
Household Services	0.016698	0.018381
Volunteer Activities	0.100595	0.079825
Professional & Personal Care Services	0.062796	0.108743
Religious and Spiritual Activities	0.097385	0.128708
Data Codes (unable to code or not elsewhere classified)	0.139007	0.161120

Activities in 2021 Analysis, Raw Difference vs. Percentage Difference

We focused on activities using the raw difference in average time, though we did calculate the percentage of time spent the difference represented. While this information was interesting, we decided not to focus on differences based on proportion of time spent. For example, the women spent almost twice the amount of time that men do on caring for and helping household members. This effect was particularly strong for activities with small average time spent, like Telephone Calls.

Table A-2: 2021 Raw Difference in Hours vs. Percentage Difference by Sex

Activity	**Raw Difference (Hours) Female vs. Male**	**Percent Difference Female vs. Male**
Household Activities	0.804665	0.525881
Personal Care Activities	0.374589	0.039457
Caring For & Helping Household (HH) Members	0.258615	0.933489
Telephone Calls	0.133301	1.436766
Consumer Purchases	0.12332	0.486539
Caring For & Helping Nonhousehold (NonHH) Members	0.078731	0.815278
Education	0.052877	0.137638

Eating and Drinking	-0.035362	-0.031358
Traveling	-0.035775	-0.036183
Sports, Exercise, & Recreation	-0.142837	-0.349566
Socializing, Relaxing, and Leisure	-0.495448	-0.098572
Work & Work-Related Activities	-1.197102	-0.306768

Activity Category Tables, Average Time by Sex, 2003-2021

We calculated average time spent on activity categories for men and women for each year. The following tables provide the average hours per day for men and women for each year and show the difference between women and men. Negative difference values mean men spent more time on the activity, while positive difference values indicate women spent more time than men.

Table A-3: Difference in time spent per day (average hours/day) on Working and Work-Related Activities

Working & Work-related Activities			
Year	**Male**	**Female**	**Difference**
2003	4.176195	2.67977	-1.496425
2004	4.056705	2.747513	-1.309193
2005	4.078586	2.777558	-1.301028
2006	4.154777	2.794634	-1.360143
2007	4.16362	2.930455	-1.233165
2008	4.157078	2.792508	-1.36457
2009	3.903149	2.646302	-1.256847
2010	3.748415	2.726659	-1.021756
2011	3.888344	2.727584	-1.16076
2012	3.820548	2.730993	-1.089555
2013	3.87754	2.56966	-1.30788
2014	3.953409	2.728027	-1.225383
2015	3.838321	2.708223	-1.130098
2016	4.046637	2.669489	-1.377148
2017	3.956083	2.67644	-1.279643
2018	3.81782	2.789228	-1.028592
2019	4.007594	2.701223	-1.306371
2020	3.608268	2.651982	-0.956286
2021	3.902297	2.705195	-1.197102

Table A-4: Difference in time spent per day (average hours/day) on Household Activities

Household Activities			
Year	**Male**	**Female**	**Difference**
2003	1.351769	2.331648	0.979879
2004	1.333693	2.291036	0.957344
2005	1.360916	2.312626	0.95171
2006	1.352799	2.263331	0.910532
2007	1.446724	2.266536	0.819812
2008	1.322877	2.189807	0.86693
2009	1.350205	2.281668	0.931463
2010	1.435982	2.180629	0.744647

2011	1.361963	2.181588	0.819625
2012	1.291577	2.173334	0.881757
2013	1.335754	2.200566	0.864812
2014	1.37084	2.154962	0.784122
2015	1.420929	2.248479	0.82755
2016	1.377854	2.250949	0.873095
2017	1.395765	2.198534	0.802769
2018	1.359229	2.16847	0.809241
2019	1.389468	2.149435	0.759967
2020	1.605385	2.31984	0.714455
2021	1.530127	2.334792	0.804665

Table A-5: Difference in time spent per day (average hours/day) on Socializing, Relaxing, and Leisure

Socializing, Relaxing, and Leisure			
Year	**Male**	**Female**	**Difference**
2003	4.747215	4.373964	-0.373251
2004	4.889786	4.398445	-0.491341
2005	4.794105	4.338679	-0.455426
2006	4.783969	4.288801	-0.495168
2007	4.772206	4.287491	-0.484715
2008	4.834978	4.423874	-0.411105
2009	4.913361	4.479333	-0.434028
2010	4.875598	4.393284	-0.482314
2011	4.882745	4.433078	-0.449667
2012	5.095133	4.502948	-0.592185
2013	4.936678	4.498344	-0.438334
2014	5.063975	4.48599	-0.577986
2015	4.943684	4.42323	-0.520454
2016	4.849807	4.310119	-0.539689
2017	4.904584	4.535924	-0.368659
2018	5.101869	4.441381	-0.660488
2019	4.889797	4.398346	-0.491451
2020	5.473261	4.658513	-0.814748
2021	5.026272	4.530824	-0.495448

Table A-6: Difference in time spent per day (average hours/day) on Personal Care over time

Personal Care			
Year	**Male**	**Female**	**Difference**
2003	9.115615	9.522518	0.406904
2004	9.119711	9.500778	0.381066
2005	9.199409	9.610402	0.410994
2006	9.199733	9.578316	0.378583
2007	9.117709	9.497846	0.380137
2008	9.209836	9.536986	0.32715
2009	9.239691	9.613096	0.373405
2010	9.23605	9.660125	0.424075
2011	9.226177	9.706944	0.480768

2012	9.199536	9.722159	0.522623
2013	9.290493	9.75145	0.460957
2014	9.302937	9.80684	0.503903
2015	9.408655	9.830583	0.421928
2016	9.308102	9.776734	0.468632
2017	9.333071	9.794135	0.461064
2018	9.339322	9.759279	0.419957
2019	9.386843	9.810445	0.423602
2020	9.490888	9.868154	0.377266
2021	9.493646	9.868235	0.374589

Table A-7: Difference in time spent per day (average hours/day) on Caring for and Helping Household Members

Caring for and Helping Household Members			
Year	**Male**	**Female**	**Difference**
2003	0.286969	0.641842	0.354873
2004	0.29639	0.649358	0.352968
2005	0.283622	0.613519	0.329898
2006	0.272903	0.614261	0.341358
2007	0.274268	0.624109	0.349841
2008	0.300181	0.591327	0.291145
2009	0.313157	0.60147	0.288314
2010	0.276797	0.57697	0.300172
2011	0.267874	0.577758	0.309884
2012	0.295978	0.566162	0.270184
2013	0.297509	0.582052	0.284544
2014	0.288664	0.609764	0.3211
2015	0.258427	0.592026	0.333599
2016	0.28479	0.586876	0.302086
2017	0.30465	0.574665	0.270015
2018	0.264847	0.589959	0.325112
2019	0.262229	0.545865	0.283636
2020	0.26622	0.586259	0.320039
2021	0.277042	0.535657	0.258615

Activity Category Comparison, Pre-COVID, COVID, and Post-COVID

For the following graphs comparing pre-COVID, COVID, and post-COVID average time spent,

- Data compiled under the pre-COVID timeline consists of all data points from 2003-2019.
- Data compiled under COVID timeline consists of data points from 2020.
- Data compiled under the post COVID timeline consists of data points from 2021.

Working and Work-related Activities

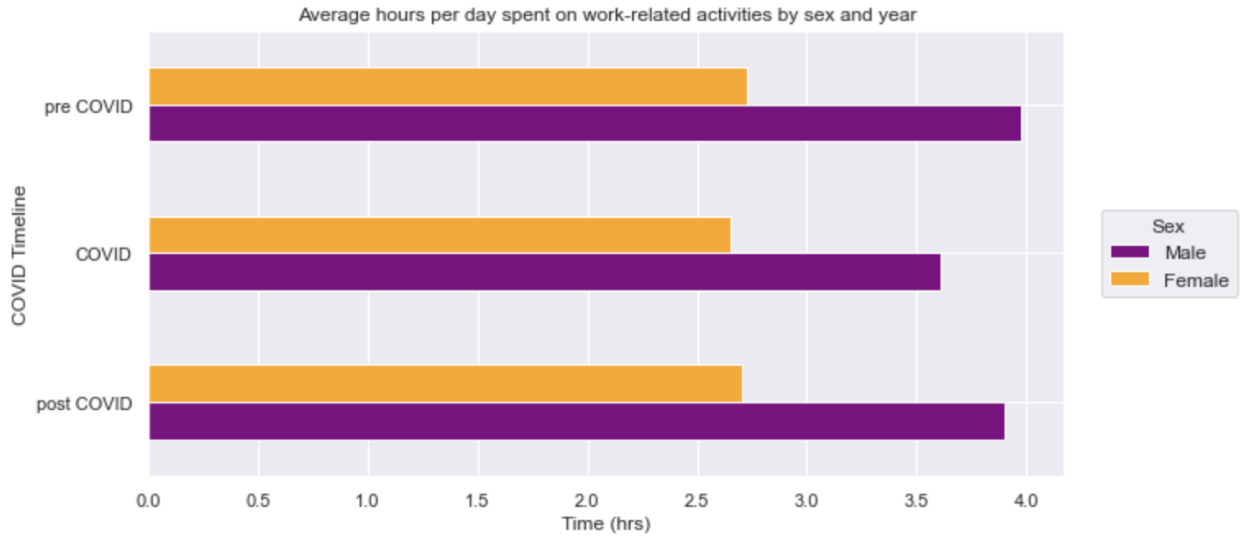

Figure A-2: Average hours per day spent on working and work-related activities by sex and year on COVID-19 timeline

Household Activities

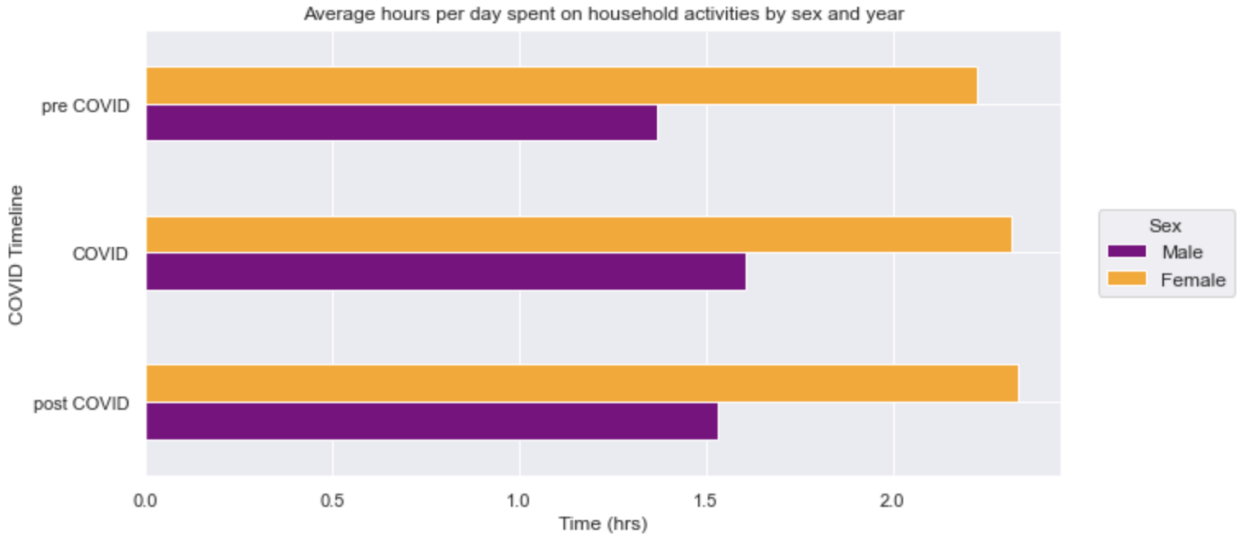

Figure A-3: Average hours per day spent on household activities by sex and year on COVID-19 timeline

Socializing, Relaxing, and Leisure

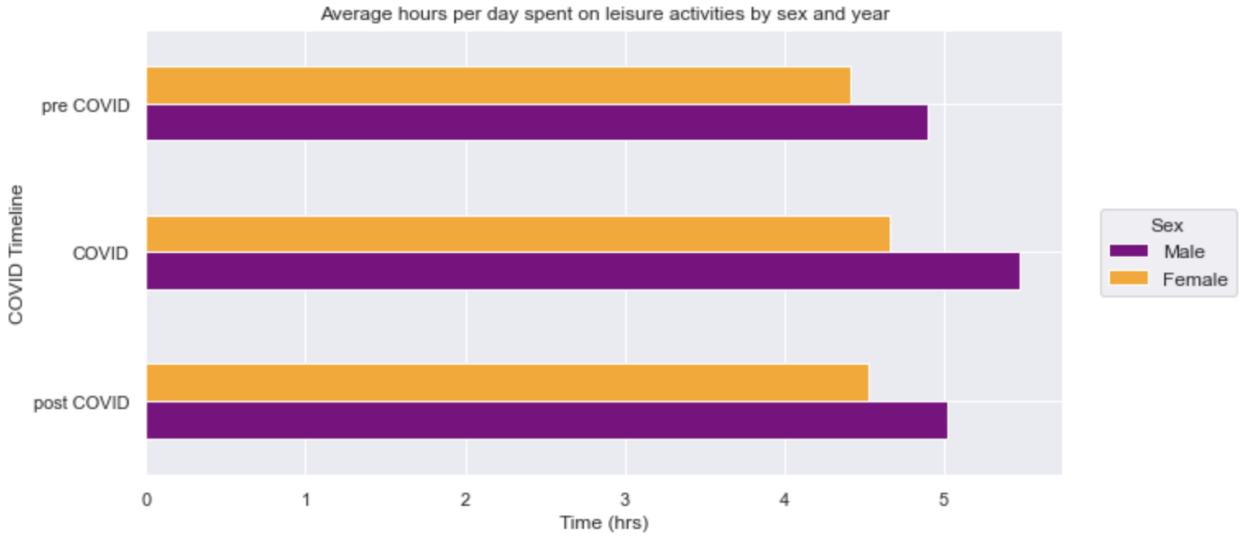

Figure A-4: Average hours per day spent on socializing, relaxing, and leisure activities by sex and year on COVID-19 timeline

Personal Care

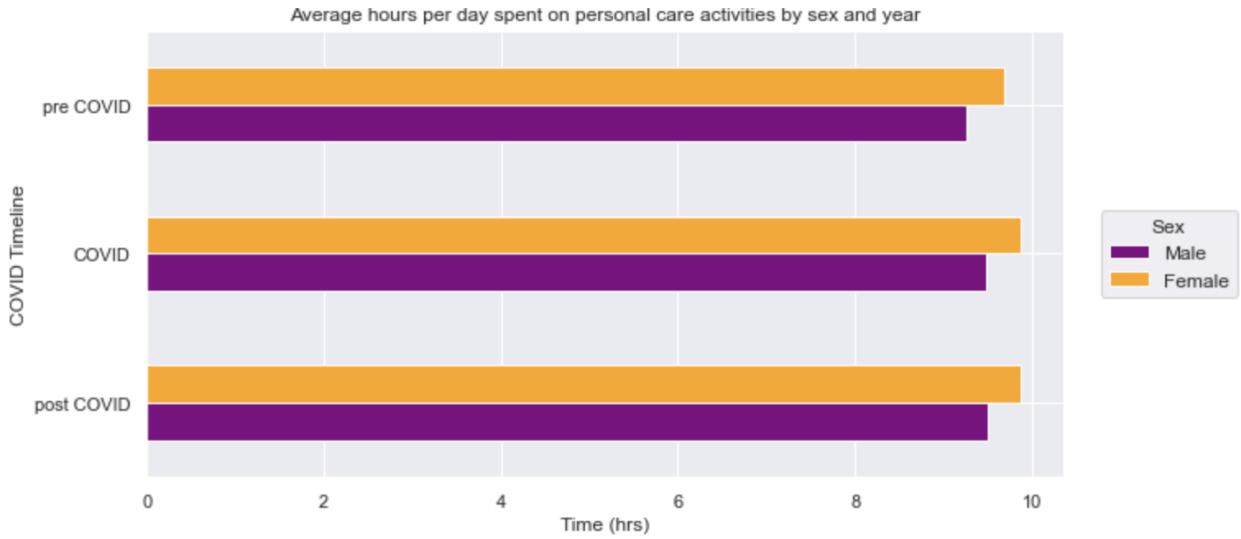

Figure A-5: Average hours per day spent on personal care activities by sex and year on COVID-19 timeline

Caring for and Helping Household Members

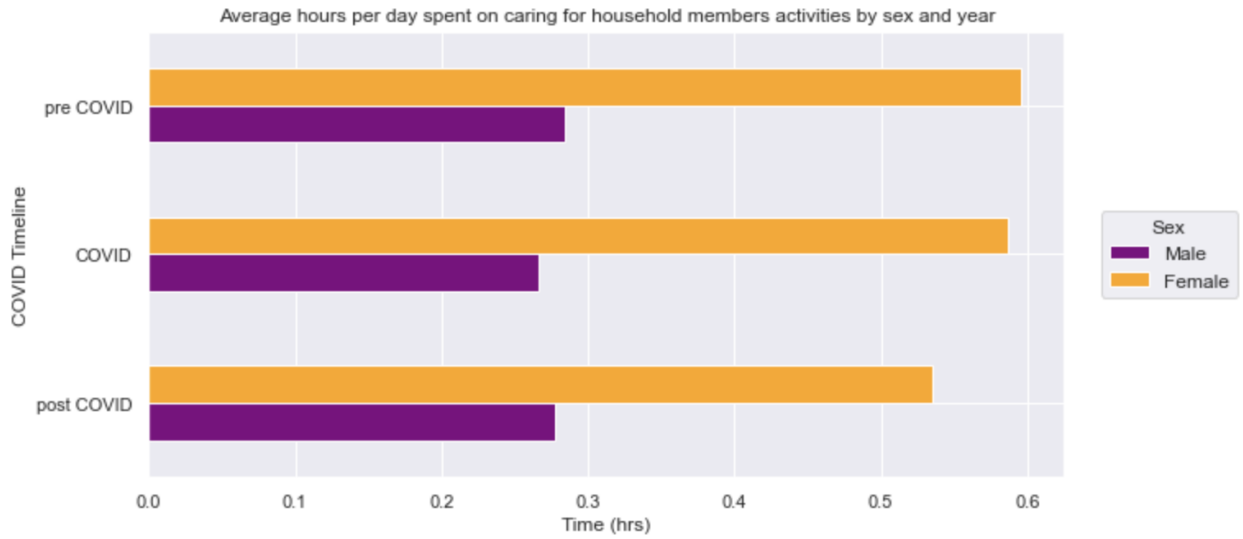

Figure A-6: Average hours per day spent on caring for and helping household members activities by sex and year on COVID-19 timeline